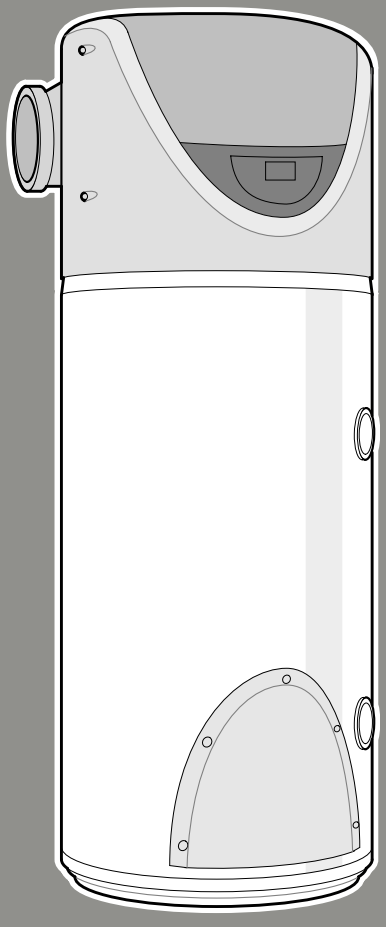
ARISTON

Instructions for Installation,
Servicing and Use

# External Air Source Heat Pump Water Heater



## NUOS FS 200
## NUOS FSi 250

Country of Destination: GB/IE

# IMPORTANT PLEASE READ

**The NUOS External Source Air Heat Pump Water Heater is intended for DOMESTIC USE ONLY.**
**The NUOS is supplied in two cartons:-**
**Carton 1 contains the NUOS appliance.**
**Carton 2 contains the fittings kit.**
**Check labels on the cartons to ensure correct NUOS unit has been delivered BEFORE opening the cartons.**
**The cardboard cartons which protect the unit should not be removed until installation.**
**Store the wrapped unit upright in a safe dry space away from frost until required.**
**Do not stack goods on the carton.**
**Do not dispose of the carton until AFTER installation.**
**The carton can be recycled.**

## Recommended Lifting

| *Model* | *NUOS Weight* | *Fittings Kit kg (max)* |
|---|---|---|
| NUOS FS 200 | 90 | 5 |
| NUOS FSi 250 | 110 | 6.5 |

It is recommended to use a sack barrow for lifting and moving the packaged NUOS.
The bottom and top of the carton has polystyrene padding to protect the unit.
Carrying the NUOS will require two fit persons.

**IMPORTANT**
**The appliance should be kept in a vertical position when transported or stored. During manual handling it can be carried at an angle (i.e. in a sack barrow) or horizontally.**
**If handling entails moving the product in a position other than vertical, wait at least 3 hours before starting the appliance once it is in the correct vertical position. This will ensure that the lubricating oil in the refrigeration circuit is correctly placed in order to avoid the compressor becoming damaged.**

**IMPORTANT**
**Failure to follow these instructions correctly may invalidate the guarantee.**

**IMPORTANT**
**The NUOS External Air Source Heat Pump Water Heater is an UNVENTED HOT WATER SYSTEM.**
**Unvented domestic hot water heating systems must be installed to comply with the current Building Regulations, British Standards and any applicable local regulations.**

**IMPORTANT**
**Hard Water. Where the mains total water hardness exceeds 200 ppm, provision should be made to treat the feed water to reduce the rate of limescale accumulation.**

**IMPORTANT - The Benchmark Scheme**
**Benchmark places responsibilities on both manufacturers and installers.**
**The purpose is to ensure that customers are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturer's instructions by competent persons and that it meets the requirements of the appropriate Building Regulations. The Benchmark Checklist can be used to demonstrate compliance with Building Regulations and should be provided to the customer for future reference. Installers are required to carry out installation, commissioning and servicing work in accordance with the Benchmark Code of Practice which is available from the Heating and Hot Water Industry Council who manage and promote the Scheme.**
Visit www.centralheating.co.uk for more information.

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LEAVE THESE INSTRUCTIONS WITH THE END USER

# 1. GENERAL INFORMATION

This manual is an integral and essential part of the product. It should be kept with the product.
Please read carefully the instructions and notes about Ariston NUOS Heat Pump Water Heater contained in this manual as they provide important information regarding the safe installation of the system.

**WARNING**
**Warnings emphasize that a potentially hazardous or dangerous situation could exist. Serious injury or death is possible if warning instructions are not obeyed.**

**CAUTION**
**Indicates precautions that if not taken could result in damage, malfunction, or abnormal operation of the equipment.**

**IMPORTANT**
**Text headed 'Important' refers to vital information that should be noted about the equipment, its use, maintenance or warranty.**

***NOTE***
*Notes are used to give additional information, understanding or to highlight a certain point. They may also be used for referrals.*

## 1.1 GUARANTEE

The Ariston External Air Source Heat Pump Water Heater is guaranteed for 5 Years (Tank) and 2 Years (electrical components) against manufacturing defect - see terms and conditions of guarantee on back page.

The manufacturers shall not be held liable for any damage due to faulty installation, improper or incorrect use or uses that are not reasonably predictable.

The guarantee is subject to:

1. The appliance being correctly installed and commissioned, as detailed in this manual.
2. The appliance being annually serviced as detailed in this manual.

## 1.2 INTENDED USE

This appliance is intended for the production of domestic hot water at temperatures up to 65°C. The appliance must be correctly connected to a domestic cold mains water supply. Electric power is required.

The appliance must not be used for any other purpose or industrial process.

## 1.3 PERSONAL RESPONSIBILITY

The manufacturer is responsible for the product's conformity to the relevant construction directives, laws and regulations in force at the time the product is first commercialised. The Plumbing Engineer/Electrician/Installer and user are each exclusively responsible in their respective fields, for knowing and observing the legal requirements and technical regulations concerning the design, installation, operation and maintenance of the appliance. Reference to laws, regulations or technical specifications contained in this manual is purely for information purposes; any new laws introduced or modifications to existing laws are not in any way binding on the manufacturer towards third parties.

## 1.4 CE Marking

The CE marking applied to the appliance certifies that it conforms to the essential requirements of the following European Directives:-

CE

2006/95/EC concerning the safety of electrical equipment.

2004/108/EC concerning electromagnetic compatibility.

Checks are carried out in conformity with the following technical standards:-

EN 255-3; EN 60335-1; EN 60335-2-21; EN 60335-2-40;
EN 55014-1; EN 61000-3-2; EN 61000-3-3; EN 50366.

The manufacturer's ability to manufacture and supply all products in conformity with the above mentioned regulations is guaranteed by a company quality management system that is certified according to the ISO 9001 2008 standard.

## 1.5 This Manual

This NUOS manual is intended for:-

1. The installer
2. The end user.

The manual is an integral and essential part of the product. It should be kept with the appliance so that it can be consulted by the user and/or authorised personnel.

To ensure that the appliance is installed and used properly and safely, both the installers and user must carefully read the instructions and precautions contained in this manual as they provide important information for both their areas of competence, regarding safety, installation, use and maintenance of the appliance.

This manual is divided into sections.

Section 1 General Information

This section is intended for both installers and users of the NUOS. It contains general information for the appliance, layout and description plus important information about the manual.

Section 2 Safety

Section 3 User Instructions

The Installer, once the system is operating correctly, should demonstrate the NUOS operation with the aid of this section.

Section 4 Installer's Settings

Installer's control parameter settings.

Section 5 Technical Data

Generally intended for the specifier and installers including technical data, dimensions and special requirements.

Section 6 Installation

Includes information for the installing Plumbing Engineer and Electrician.

Section 7 Commissioning System

Essential information for the installer for the completion of the NUOS installation.

Section 8 Maintenance

Includes maintenance and fault finding.

Section 9 Benchmark Logbook

## 1.6 Basic Principles Of A Heat Pump

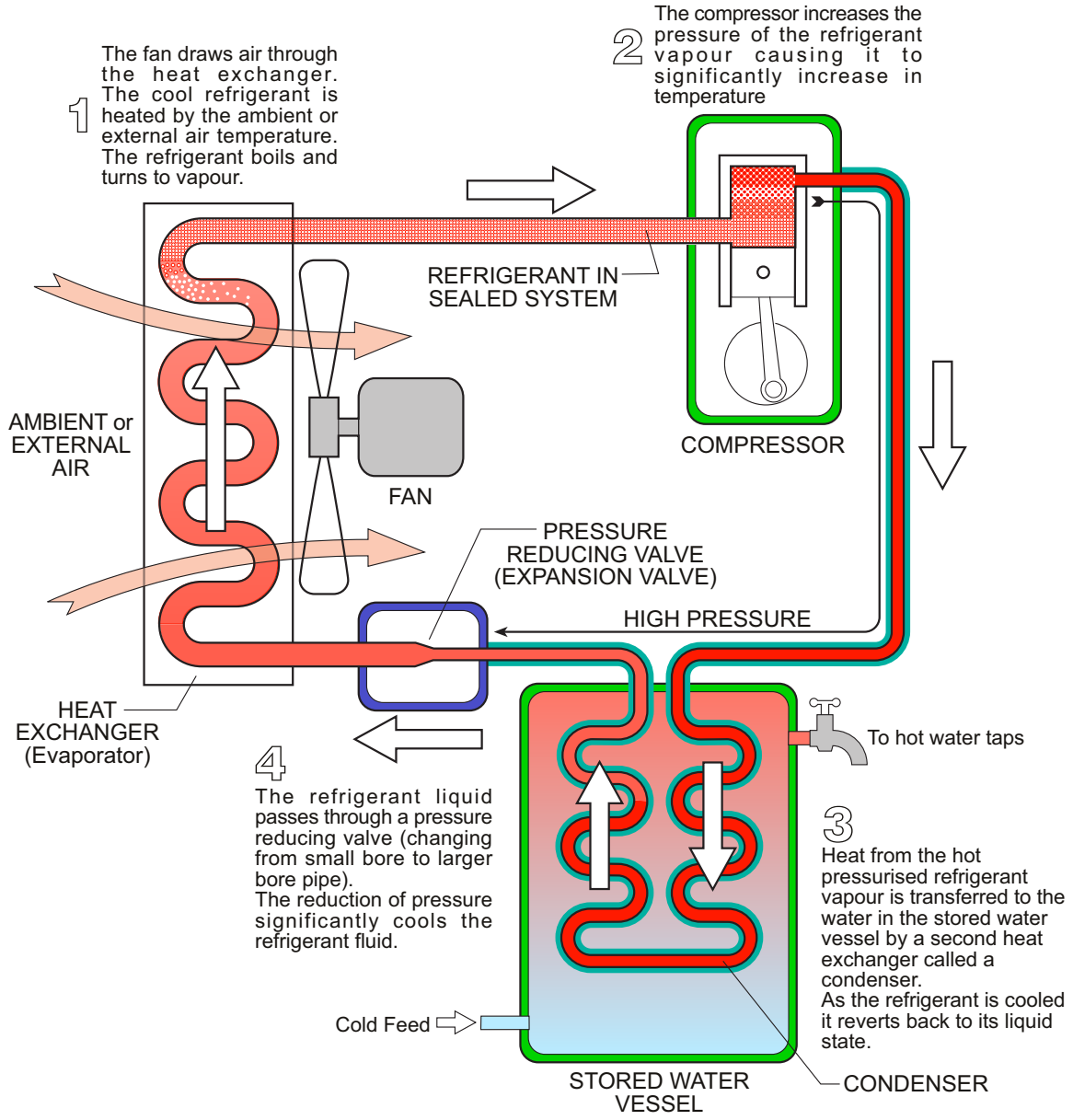

1
The fan draws air through the heat exchanger. The cool refrigerant is heated by the ambient or external air temperature. The refrigerant boils and turns to vapour.
2
The compressor increases the pressure of the refrigerant vapour causing it to significantly increase in temperature
REFRIGERANT IN SEALED SYSTEM
COMPRESSOR
AMBIENT or EXTERNAL AIR
FAN
PRESSURE REDUCING VALVE (EXPANSION VALVE)
HIGH PRESSURE
HEAT EXCHANGER (Evaporator)
4
The refrigerant liquid passes through a pressure reducing valve (changing from small bore to larger bore pipe).
The reduction of pressure significantly cools the refrigerant fluid.
To hot water taps
3
Heat from the hot pressurised refrigerant vapour is transferred to the water in the stored water vessel by a second heat exchanger called a condenser.
As the refrigerant is cooled it reverts back to its liquid state.
Cold Feed
STORED WATER VESSEL
CONDENSER

*Fig. 1.6a Basic Principles*

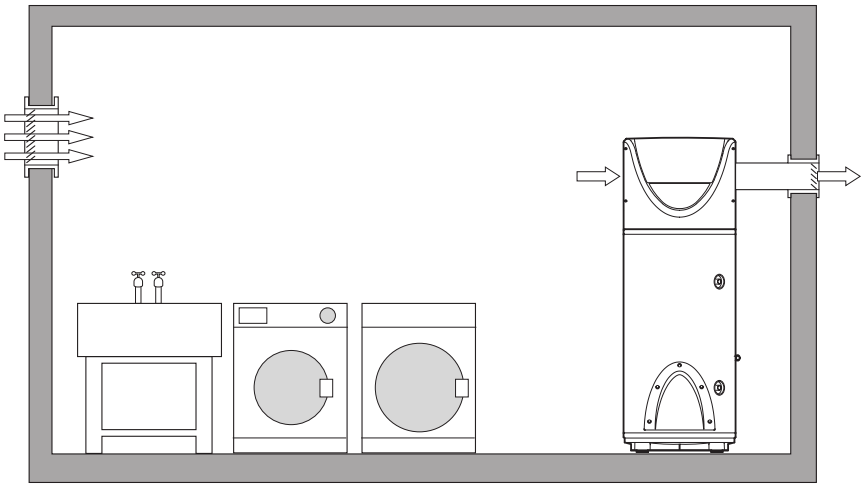
## 1.7 Efficiency

Within the heat pump the refrigerant is warmed from its cooled state to the ambient or external air temperature. This heat gain is largely free energy.

Electricity is used to power the fan which draws air, and also the compressor which pressurises the refrigerant to increase it's heat. A small amount of electricity is also required to run the heat pump's control system.

The efficiency of a heat pump cycle is stated by its Coefficient of Performance (COP) value. This is a ratio between the energy produced by the heat pump to the electrical energy supplied to it. For example a COP of 3.0 indicates that for every 1kW of electricity used the heat pump will produce 3.0 kW of hot water, therefore giving 2.0kW of free energy.

## 1:8 Typical Installations

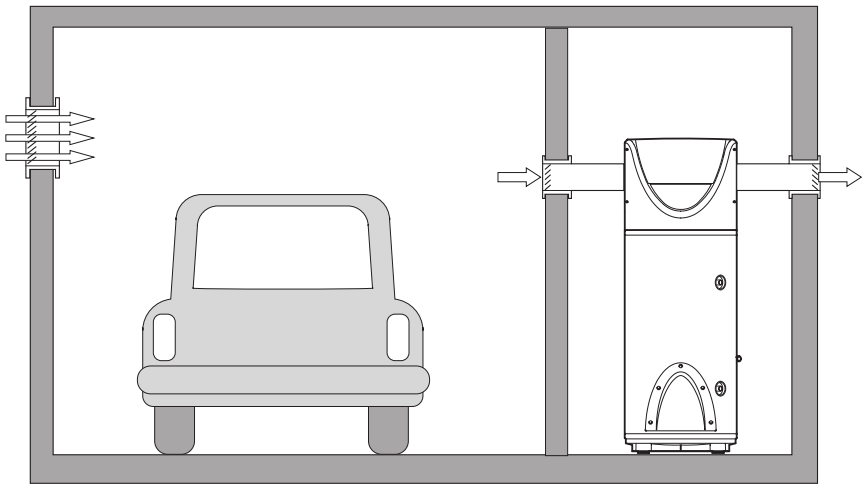


**Example 1.**

NUOS installed in Utility Room.

Inlet air from room - not ducted.

Exhaust air ducted to outside.

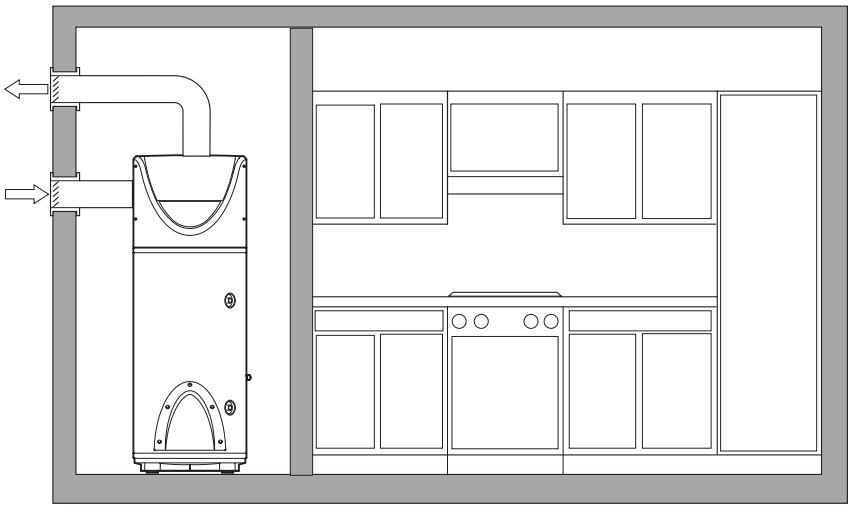


**Example 2.**

NUOS installed in garage/outhouse.

Inlet air from internal duct.

Exhaust air ducted to outside from side of unit.



**Example 3.**

NUOS installed in compartment.

Inlet air from outside.

Exhaust air ducted to outside high level from top of unit.

## 1.9 NUOS Components Identification

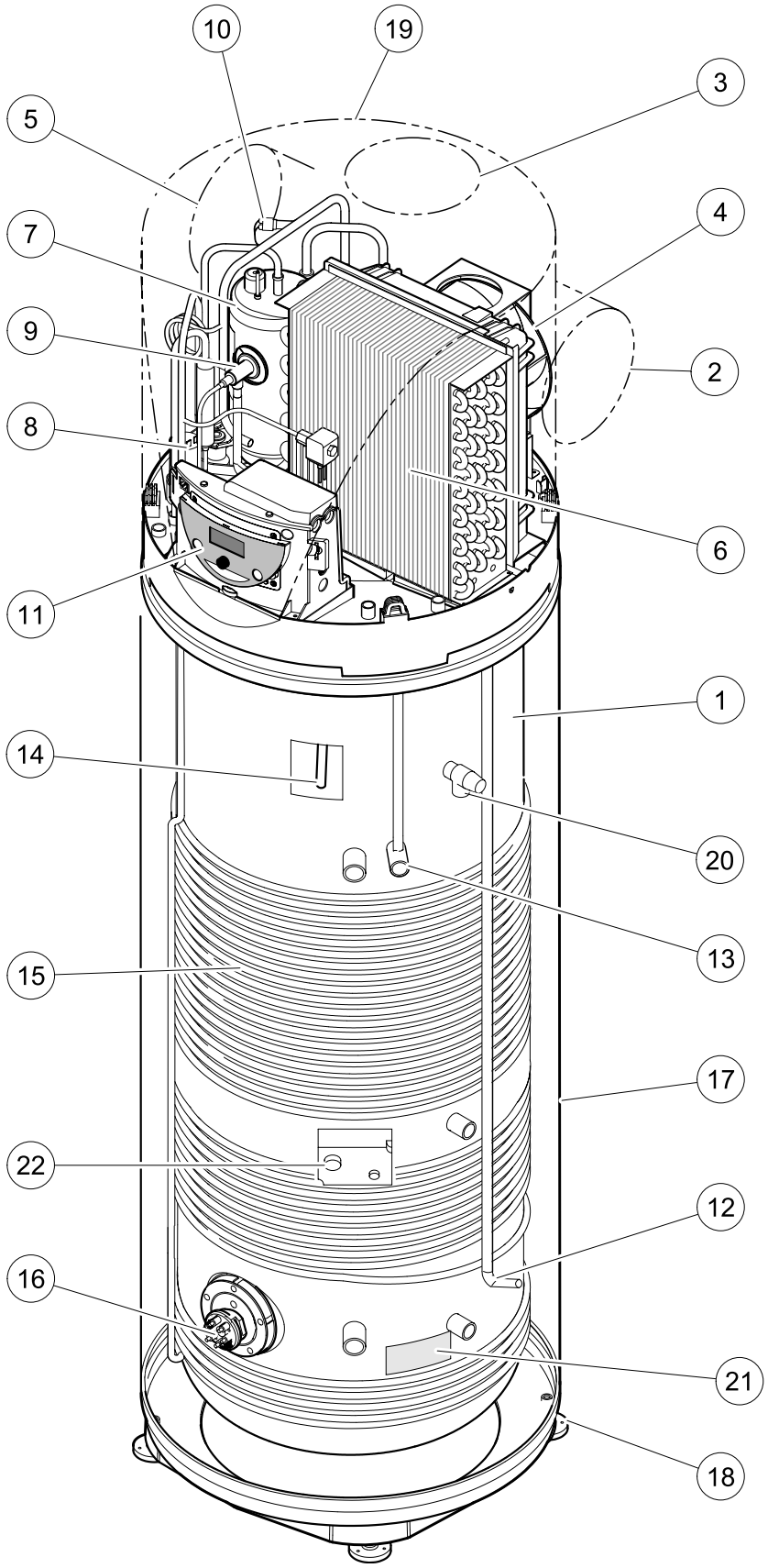



*Fig. 1.9a NUOS Components Identification*

## 1.9 NUOS Components Identification continued

1. NUOS Cylinder
2. Air Fan Outlet - Side
3. Air Fan Outlet - Top
4. Air Fan
5. Ambient Air Inlet
6. Evaporator
7. Compressor
8. Compressor Condenser
9. Thermostatic Expansion Valve
10. Pressure Safety Switch
11. Control Panel
12. Condensate Drain Pipe
13. DHW Temperature Sensor
14. Anode
15. Heat Exchanger (Condenser)
16. Electric Heating Element and Heating Element Zone Sensors and Magnesium Anode
17. Casing
18. Height Adjustable Feet
19. Top Cover
20. Cylinder TPR Valve
21. Product Label
22. Manual Reset Overheat Stat (FSi 250 Only)

***NUOS Components Identification List***

## 1.10 General Layout

The NUOS water heater essentially comprises an upper compartment containing the heat pump assembly, a module which includes the control panel and control circuit boards, and a storage vessel.

## 1.11 Storage Vessel

The storage vessel is internally coated with protective enamel treatment and is externally insulated by a high efficiency polyurethane layer. The storage vessel is enclosed within a powder coated steel casing.

## 1.12 Heating Element

The heater element fits into the side of the storage vessel. It is electrically powered to heat the water to boost the heat pump performance or to heat the water when the heat pump is off.

## 1.13 Supply Air

The air for the NUOS enters through a round vent at the rear of the unit. The air could be from within the room or ducted from another room, internal space within the dwelling or more typically from outside.

## 1.14 Exhaust Air

The exhaust air for the appliance can be directly into the room, or, by using various ducting arrangements, be ducted to another room or more typically to outside the dwelling.

*For further considerations for supply and exhaust air refer to sections 6.2 and 6.3.*

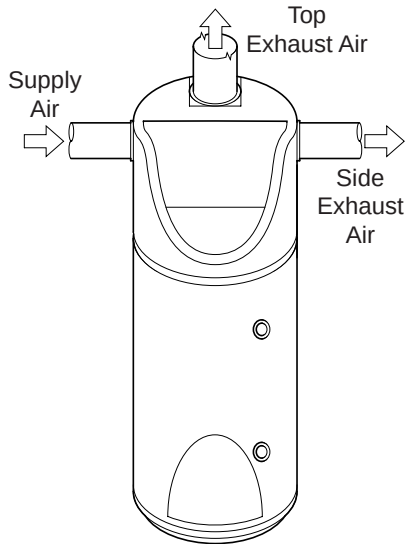



***Fig. 1.14a Air Supply & Exhaust***

# 2. SAFETY

## 2.1 Floor Mounting

The NUOS weights when full are:-
NUOS 200 - 290kg

NUOS 250i - 360kg

The floor on which the unit is to be standing must be capable of supporting (locally) the weight of the full unit.

Do not install the cylinder on floors made of chipboard or other flooring where the mechanical strength is compromised when damp.

## 2.2 Electrical

The NUOS should have 240V 10.8 amp electrical supply.

All electrical terminal covers must be screwed on before power is switched on.

The unit must be earthed.

The pipework to and from the unit must be earth bonded.

The unit must be protected by a 13 amp fuse.

## 2.3 Unvented

The NUOS heat pump is classed as an unvented cylinder.

It must be protected by a pressure relief valve (PRV) and expansion vessel as detailed in section 6.9.

No valves must be fitted between the vessel and the PRV.

No valves must be fitted between the vessel and its expansion vessel.

## 2.4 Personal Protection

When installing and servicing the appliance Ariston Thermo UK Ltd. recommend the use of suitable protective clothing (i.e. gloves).

## 2.5 Transportation

Also refer to page 2

It is recommended to use a sack barrow for lifting and moving the packaged NUOS.

Carrying the NUOS will require two fit persons.

Always follow the safe lifting guidelines as recommended by the Health And Safety Executive www.hse.gov.uk.

**IMPORTANT**
**The appliance should be kept in a vertical position when transported or stored. During manual handling it can be carried at an angle (i.e. in a sack barrow) or horizontally.**
**If handling entails moving the product in a position other than vertical, wait at least 3 hours before starting the appliance once it is in the correct vertical position. This will ensure that the lubricating oil in the refrigeration circuit is correctly placed in order to avoid the compressor becoming damaged.**

## 2.6 Refrigerant

Refer to Section 5.2 Technical Data

# 3. USER INSTRUCTIONS

**IMPORTANT**

**This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.**

**Once the NUOS unit has been fully commissioned, the installer must give full guidance of use to the end user.**

## 3.1 CONTROL PANEL

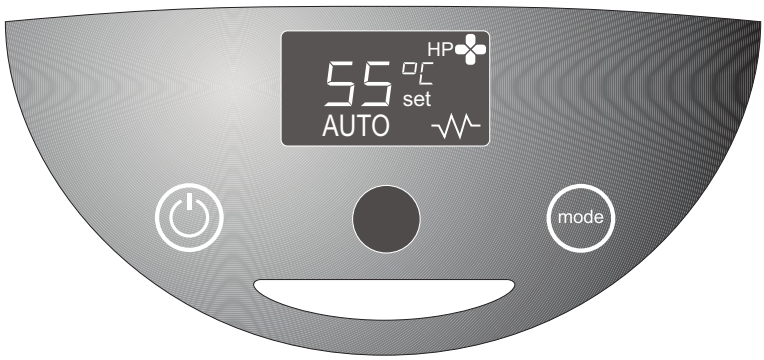



*FIG. 3.1A CONTROL PANEL*

**ON/OFF Button**

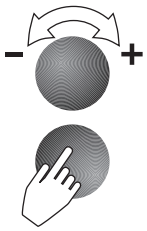
Press to turn NUOS ON.

Press again to turn OFF.

**Mode Button**

Press to select mode either Auto, Boost and Green, Voyage, P1,P2 or P1+P2 (if enabled).

Also press to exit from installer and information menus.




**Control Knob - User**

Turn knob clockwise to increase to desired set temperature.

Turn knob anticlockwise to decrease to desired set temperature.

Press and release knob and the current temperature of the water within the tank will be displayed for 5 seconds.

**Control Knob - Information Menu**

Press and hold the knob for 5 seconds to display Information Menu.

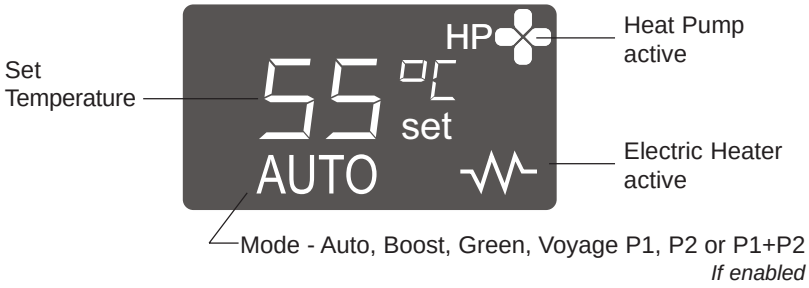
Turn knob clockwise / anticlockwise to scroll through information parameters L0 to L14.

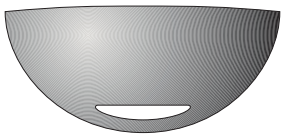
Press knob at selected parameter and it's current value will be displayed. Press knob again (or mode button) to return to Information menu.

*For Installer Menu operation refer to 4.1.*

**Display**

Displays set temperature °C, mode, heat pump status and electric heater status.



**Smile Led**

ON indicates NUOS is heating water.

Will also flash when system error is displayed, see 8.3.

## 3.2 Turning NUOS On

To turn the NUOS ON and OFF, press the ON/OFF button.

The unit will turn ON in the same mode as when it was turned OFF i.e. Auto, Boost, Green, Voyage, P1, P2 or P1+P2 (if enabled).

## 3.3 Default Settings

The NUOS has the following default settings on initial power up.

* See page 16

| Parameter | Installers Menu parameter* | Default Setting |
|---|---|---|
| Set Temperature | - | 55°C |
| Min. Settable Temp. | P2 | 50°C |
| Max Settable Temp.(with heat pump only) | P3 | 55°C |
| Mode - Auto | - | On - Enabled |
| Mode - Boost | - | On - Enabled |
| Mode - Green | P4 | Off - Disabled |
| Mode - Voyage | P6 | Off - Disabled |
| Mode - Programs P1 & P2 | P11 | Off - Disabled |
| Programme P1 Temp. | - | 55°C |
| Programme P1 Time | - | 06:00hrs |
| Programme P2 Temp. | - | 55°C |
| Programme P2 Time | - | 18:00hrs |
| Antibacterial Function | P5 | Off - Disabled |
| Defrost | P7 | On - Enabled |
| Time_W | P9 | 8 hours |

## 3.4 Setting Desired Temperature

The desired temperature for the hot water is set using the 'Control knob' - refer to 3.1.

The minimum temperature that can be achieved by the heat pump is between 40°C and 50°C this limit is set by parameter P2.

The maximum temperature that can be achieved by the heat pump without using the heater element is between 50°C and 55°C this limit is set by parameter P3.

The maximum temperature that can be achieved using the electric heater is 65°C.

## 3.5 Setting Operating Mode

The mode is set using the 'Mode Button' - refer to 3.1

**Auto Mode**

The NUOS operates giving priority to the heat pump to reach the set temperature within a set time duration as determined by parameter P9 (default 8 hours). If the control calculates that the heat pump alone cannot achieve the set temperature within this time, then the heating element is used as economically as possible to achieve the set temperature.

**Boost Mode**

The NUOS operates with both heat pump and heating element to achieve the set temperature in the shortest time. Once the set temperature is reached the control switches to Auto mode.

**Green Mode**

The NUOS will operate using only the heat pump to achieve the set temperature, without any time duration limit. This ensures maximum energy saving.

*Note the heating element will still operate for defrost, antibacterial functions and when air temperature is out of operating range.*

This function is recommended for air temperatures above 0°C during the hours of heating.

Green mode is enabled/disabled by installer menu parameter P4.

The maximum temperature that can be achieved in green mode is between 50°C and 55°C this limit is set by parameter P3.

**Voyage (holiday) Mode**

Voyage mode is enabled/disabled by installer menu parameter P6.

Voyage mode enables the user to set a number of days that the NUOS will not produce hot water.

The defrost will remain if enabled by P7.

*Voyage Mode & Program Mode:- In the event of a power failure the NUOS automatically switches to Auto Mode.*

The antibacterial function P5 will remain if enabled by P5.

To set holiday days:-

1. Press 'mode' button until Voyage mode is displayed.
2. Turn control knob until the required number of days is displayed.
3. Press control knob to confirm.

The display will show the number of holiday days remaining.

When the set number of days have passed the NUOS will produce hot water again in Auto mode. Therefore to return home and have hot water available, set one day less than the days away.

**Program Mode**

Program mode is enabled/disabled by installer menu parameter P11.

There are three programme modes P1, P2 and P1+P2.

*P1 and P2 are not switch on times as normal water heating systems.*
*The NUOS will start heating water depending on the ambient temperature to provide hot water at the set times for P1 and P2.*

*The NUOS time setting must be correct for P1 and P2 to operate on time - see 3.8.*

**P1** Hot water will be available once per day @ P1 set time @ P1 set temperature.

**P2** Hot water will be available once per day @ P2 set time @ P2 set temperature.

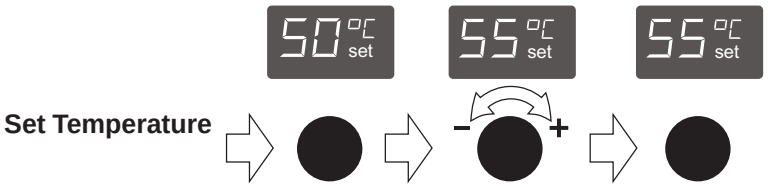
**P1 + P2** Hot water will be available twice per day
First @ P1 set time @ P1 set temperature.
Second @ P2 set time @ P2 set temperature.

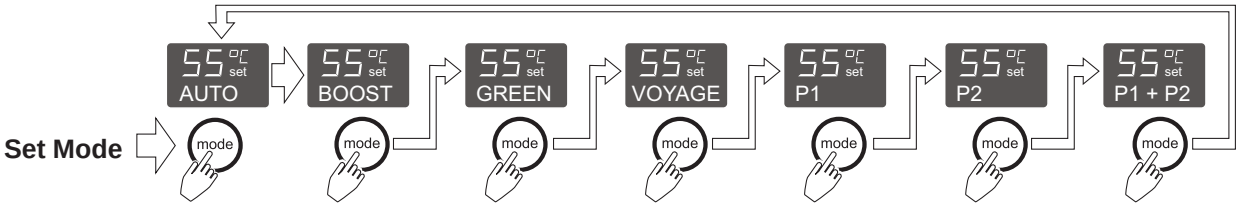
To set P1 and P2 times and temperatures:-

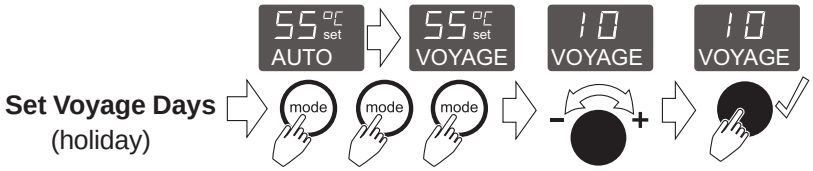
1. Press 'mode' button until P1 mode is displayed.
2. Turn control knob until the required temperature is displayed.
3. Press control knob to confirm.
4. Turn control knob again until the required time is displayed.
5. Press control knob to confirm.

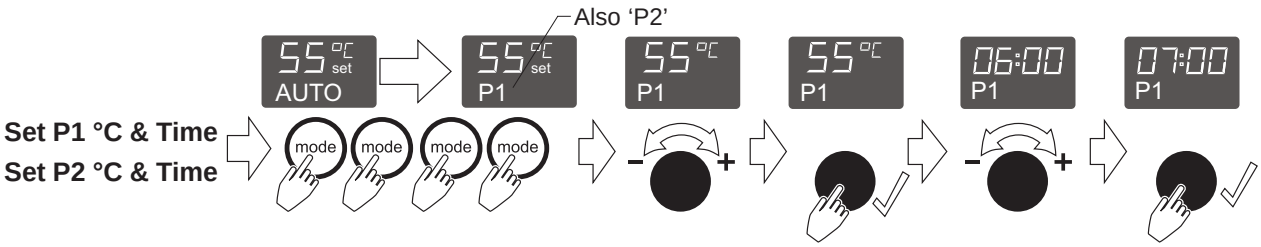
Repeat above for P2.

## 3.6 User Setting Procedures




## 3.7 Summary of NUOS Operation

| Mode | Enabled Disabled by:- | Temperature | Heat Pump | Electric Heater |
|---|---|---|---|---|
| **Auto** | Always available | 40-55°C | ✓ | ✓ When required |
| | | 55-65°C | × | ✓ Always |
| **Boost** | Always available | 40-55°C | ✓ | ✓ Always |
| | | 55-65°C | × | ✓ Always |
| **Green** | P4 | 40-55°C | ✓ | × ✓ Defrost* ✓ Antibacterial* |
| **Voyage** | P6 | 5°C min | × | × |
| **Defrost** | P7 | 5°C min | ✓ | ✓ When required |
| **Antibacterial** | P5 | 65°C | ✓ | ✓ |
| **P1 and P2** | P11 | 40-55°C | ✓ | ✓ When required |
| | | 55-65°C | × | ✓ Always |

* When enabled

## 3.8 Information Menu

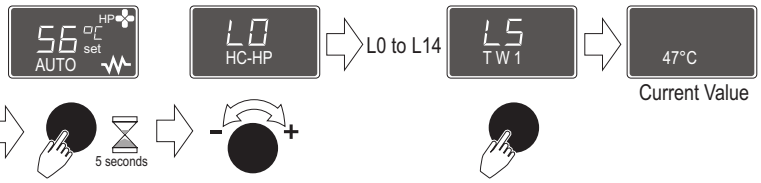
The Information Menu is displayed by pressing the control knob for 5 seconds.

The menu displays operating function status and monitoring information.

No changes can be made within the information menu (except current time L0), any other settings that can be changed are changed in the installers menu - see 4.1

Accessing Information Menu:-

1. Press control knob for 5 seconds.
2. Turn control knob until the required L number is displayed.
3. Press control knob to view current value / setting.



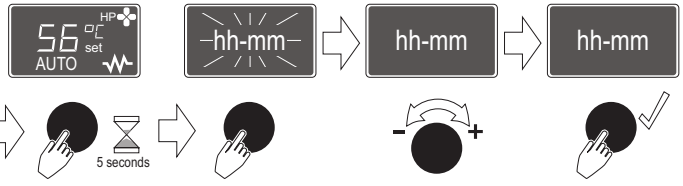

**Access Information Menu**




| Information Label | Screen Display | Value | Controlled by Parameter | Decription |
|---|---|---|---|---|
| **L0** | hh:mm | hh:mm | P11 | Displays current set time. Can be reset by turning knob. Only available when P11 is set to ON. |
| **L2** | TIME_W | Hours | P9 | Set maximum hours of NUOS operation |
| **L3** | ANTI_B | On or Off | P5 | Shows setting of antibacterial function. |
| **L4** | T HP | °C | P3 | Shows setting for the maximum heat pump temperature |
| **L5** | T W1 | °C | - | Displays current temperature recorded by sensor 1 |
| **L6** | T W2 | °C | - | Displays current temperature recorded by sensor 2 |
| **L7** | T W3 | °C | - | Displays current temperature recorded by dome sensor |
| **L8** | T AIR | °C | - | Displays current temperature recorded by air intake sensor |
| **L9** | T EVAP | °C | - | Displays current temperature recorded by evaporator sensor |
| **L10** | DEFROS | On or Off | - | Shows setting of frost protection function. |
| **L11** | HP h | °C | - | Meter for internal parameter 1 |
| **L12** | HE h | °C | - | Meter for internal parameter 2 |
| **L13** | SW MB | ref | - | Main PCB software version |
| **L14** | SW HMI | ref | - | Interface PCB software version |
| **PO** | Code | 222 | P0 | Enables entry to installers menu, when correct code is selected |

To set current time

1. Press control knob for 5 seconds until L0 hh:mm is displayed.
2. Press control knob again
3. Turn control knob to change current time.
4. Press control knob again.




**Setting Current Time L0**

# 4. INSTALLERS SETTINGS

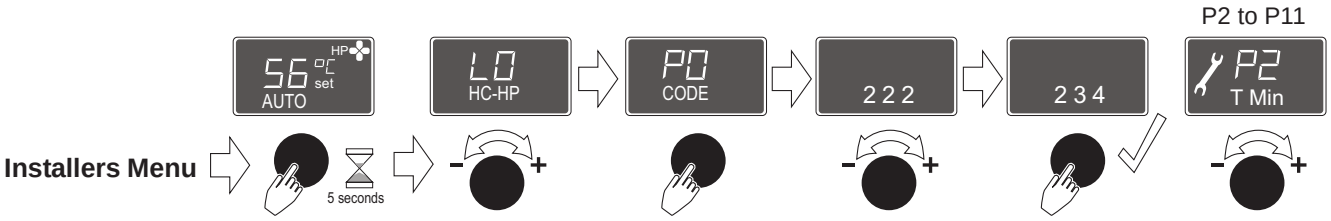
## 4.1 INSTALLERS MENU

The Installers Menu is displayed by entering the correct code when P0 is displayed in the information menu.

The menu enables the installer to set the NUOS operating parameters.

Accessing Information Menu:-

1. Press control knob for 5 seconds.
2. Turn control knob and go through L0 to L14 then the display will show P0 code.
3. Press control knob again and the code 222 will be displayed.
4. Turn control knob to change the code to 234.
5. Press control knob, the installers menu P2 to P11 will then be available by turning control knob.




| Parameter | Screen Display | Value / Range | Decription |
|---|---|---|---|
| **P0** | CODE | 234 | Code required to enter installers menu |
| **P2** | T Min | 40°C to 50°C | Sets the minimum temperature that the NUOS can be set to. |
| **P3** | T HP | 50°C to 55°C | Sets the maximum obtainable temperature, when the NUOS is operating with heat pump only. |
| **P4** | GREEN | On / Off | On - Enables the green mode see - 3.5<br>Off - Disables the 'green' mode |
| **P5** | ANTI_B | On / Off | On - Enables the Antibacterial mode see - 3.5<br>Off - Disables the Antibacterial mode |
| **P6** | VOYAGE | On / Off | On - Enables the Voyage mode see - 3.5<br>Off - Disables the Voyage mode |
| **P7** | DEFROS | On / Off | On - Enables the Frost Protection mode<br>Off - Disables the Frost Protection mode |
| **P9** | TIME_W | 5hours to 24hours | Sets the permited number of operation hours for the NUOS |
| **P10** | RESET | - | Enables resetting of the NUOS default settings.<br>Select parameter P10 and press control knob. |
| **P11** | PROG | On / Off | On - Enables the Programmemode P1,P2 and P1+P2 see - 3.5<br>Off - Disables the Programme mode P1,P2 and P1+P2 see - 3.5 |

# 5. TECHNICAL DATA

## 5.1 DIMENSIONS

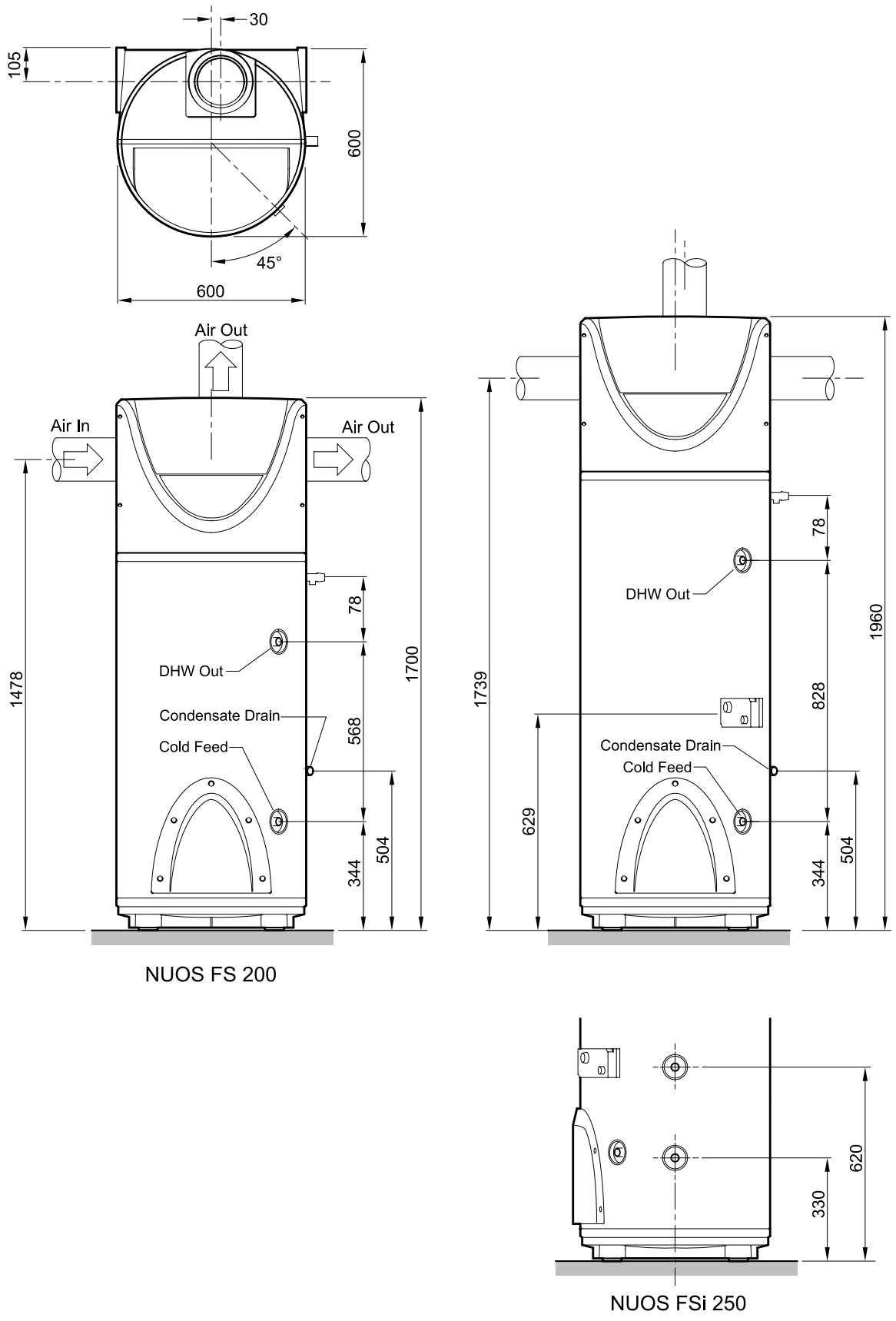



*FIG. 5.1A DIMENSIONS*

## 5.2 Technical Data

| Description | FS 200 | FSi 250 |
|---|---|---|
| Tank Rated Capacity | 200 litre | 250 litre |
| Footprint (minimum) | 0.6 x 0.6m | 0.6 x 0.6m |
| Height | 1.70m | 1.96m |
| Weight Empty | 90kg | 110kg |
| Weight Full | 290kg | 360kg |
| Minimum ceiling height required | 1.75m | 2m |
| Maximum Operating Pressure | 6 bar | 6 bar |
| Condensate Drain | ½" BSP F | ½" BSP F |
| Air Intake | Ø150mm | Ø150mm |
| Air Exhaust | Ø150mm | Ø150mm |
| Maximum Duct Static Loss * | 70Pa | 70Pa |
| **Cylinder** - Tested in accordance with:- | BS6700 | EN 12897:2006 |
| Normal Operating Pressure | 3.5 bar | 3.5 bar |
| Maximum Water Supply Pressure | 12 bar | 12 bar |
| Cold Connection (feed) | ¾" BSP-22mm MI | ¾" BSP-22mm MI |
| Hot Connection (draw off) | ¾" BSP-22mm MI | ¾" BSP-22mm MI |
| Pressure Reducing Valve Set Pressure | 3.5 bar | 3.5 bar |
| Cylinder TPRV | 90-95ºC / 7 bar | 90-95ºC / 7bar |
| Combination Valve PRV | 6 bar | 6 bar |
| Expansion Vessel Pre-Charge Pressure | 3.5 bar | 3.5 bar |
| **Cylinder Indirect Coil** | | **FSi 250 only** |
| Connections | | ¾" BSP-22mm |
| Surface Area | | 0.65m² |
| Maximum Supply Pressure | | 6 bar |
| Rating @ 60°C | | 210.0 litres |
| Primary Flow Rate | | 15 l/min. |
| Pressure Drop through coil @15l/m | | 14 mbar |
| **Heat Pump** | | |
| Heat Rating** | 2.775 kW | 2.775 kW |
| Power Consumption** | 0.75 kW | 0.75 kW |
| COP** (see 1.7) | 3.7 | 3.7 |
| Heating Time** | 3h:10min. | 3h:40min. |
| Heating Energy Consumed** | 2.2 kWh | 2.7 kWh |
| Max. Water in Single Intake V40 @ 55°C | 260 litres | 325 litres |
| Max. Water in Single Intake V40 @ 62°C | 348 litres | 435 litres |
| Max. Water Temperature | 55°C | 55°C |
| Max. Current Consumption | 3 amp | 3 amp |
| Expansion Valve Operating Pressure | 10-24 bar | 10-24 bar |
| **Refrigerant Fluid** | | |
| Type of Fluid | R134a | R134a |
| Quantity | 1.28 kg | 1.28 kg |
| Practical Limit for Room Volume*** | 5.12m³ | 5.12m³ |
| Max. Pressure of Circuit - low side | 1.0 MPa | 1.0 MPa |
| Max. Pressure of Condenser Coil | 24 bar | 24 bar |
| Max. Pressure of Circuit - high side | 2.5 MPa | 2.5 MPa |

*Maximum permissible static loss for both supply air duct and exhaust air duct, when applicable.
**Values obtained with air temp. of 15°C and 37% relative humidity, input water temp. 15°C (in conformity to EN 255-3 specifications).
***The practical limit is the minimum room volume the appliance should be installed in, the volume is based on quantity of refrigerant in the system. In the event of a sudden release of refrigerant then the minimum room volume will make it safer for the engineer.

## 5.2 Technical Data CONTINUED

| Description | All models | |
|---|---|---|
| **Electric** | | |
| Electric Supply | 220/240V, Single Phase, 50 Hz | |
| Amp | 10.8 amp | |
| Connection | 3 core flex supplied 1.2m long | |
| Fuse Required | 13 amp | |
| Protection | IPX4 | |
| Bathroom Zone | Zone 2 - Switches/Fuse Zone 3 | |
| Electric Heater Rating | kW1.5+1 | |
| Electric Heater Length | 470mm | |
| Electric Heater Type | (1) | |
| Electric Heater Max. Temp. | 65°C | |
| **Air** | | |
| Air Flow Rate | 300 - 500 m³/h | |
| Available Static Pressure | 70 Pa | |
| Sound Level @ 1m | 56 dB(A) | |
| Min. temp of room of installation | 1°C | |
| Max. temp of room of installation | 35°C | |
| Min. Volume of Room (non-ducted) | 20 m³ | |
| Min. Air Temp Required (w.b.) @ 90% r.h. | -5°C | |
| Max. Air Temp Required (w.b.) @ 90% r.h. | 35°C | |
| **Description** | **FS 200** | **FSi 250** |
| **Reheat Time** (▲T 45°C) mins | | |
| Heat Pump only (Green Mode) @ 100% capacity | 236 mins | 274 mins |
| Heat Pump only (Green Mode) @ 70% capacity | 181 mins | |
| Heat Pump & Heater (Boost Mode) @100% capacity | 140 mins | |
| Heat Pump & Heater (Boost Mode) @ 70% capacity | 114 mins | |
| Model time to raise 100% temp. from 15°C to 65°C | 152 mins | |
| Model time to raise 70% temp. from 15°C to 65°C | 124 mins | |
| **Insulation** | | |
| Heat Loss @ 65ºC | 2.06 kW/24hr | 2.05 kW/24hr |
| Ozone Depletion Potential (ODP) | 0 | 0 |
| Global Warming Potential (GWP) | <5 | <5 |

## 5.3 Kit Contents

**Direct kit for NUOS FS 200 pt. no. 3069418**

Qty 1 Pressure Reducing Valve
Qty 1 Security Valve (6 bar)
Qty 1 Tundish
Qty 1 Expansion Vessel (18 litre)

**Direct kit for NUOS FSi 250 pt. no. 3069419**

Qty 1 Pressure Reducing Valve
Qty 1 Security Valve (6 bar)
Qty 1 Tundish
Qty 1 Expansion Vessel (18 litre)
Qty 1 2 Port Motorised Valve

## 5.4 Product Label

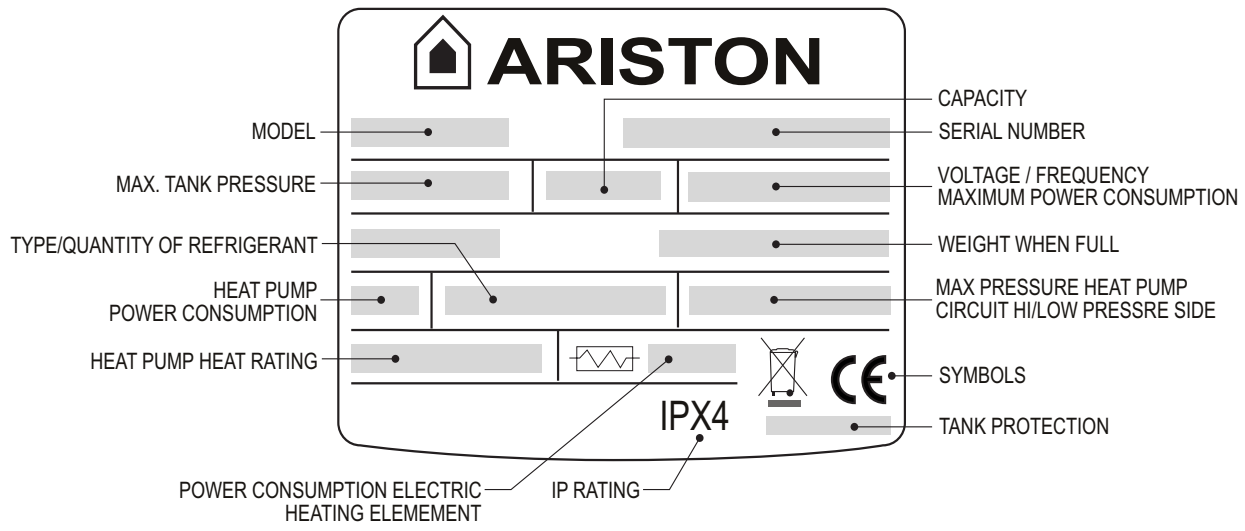



*Fig. 5.4a Product Label*

## 5.5 Regulations

The appliance should be installed in accordance with the Domestic Heating Compliance Guide and BS 3456.

## 5.6 Water Regulations

These regulations (bye-laws in Scotland), ensure a good supply of wholesome water and that only approved materials, pipes and fittings are used to convey water.

## 5.7 Building Regulations

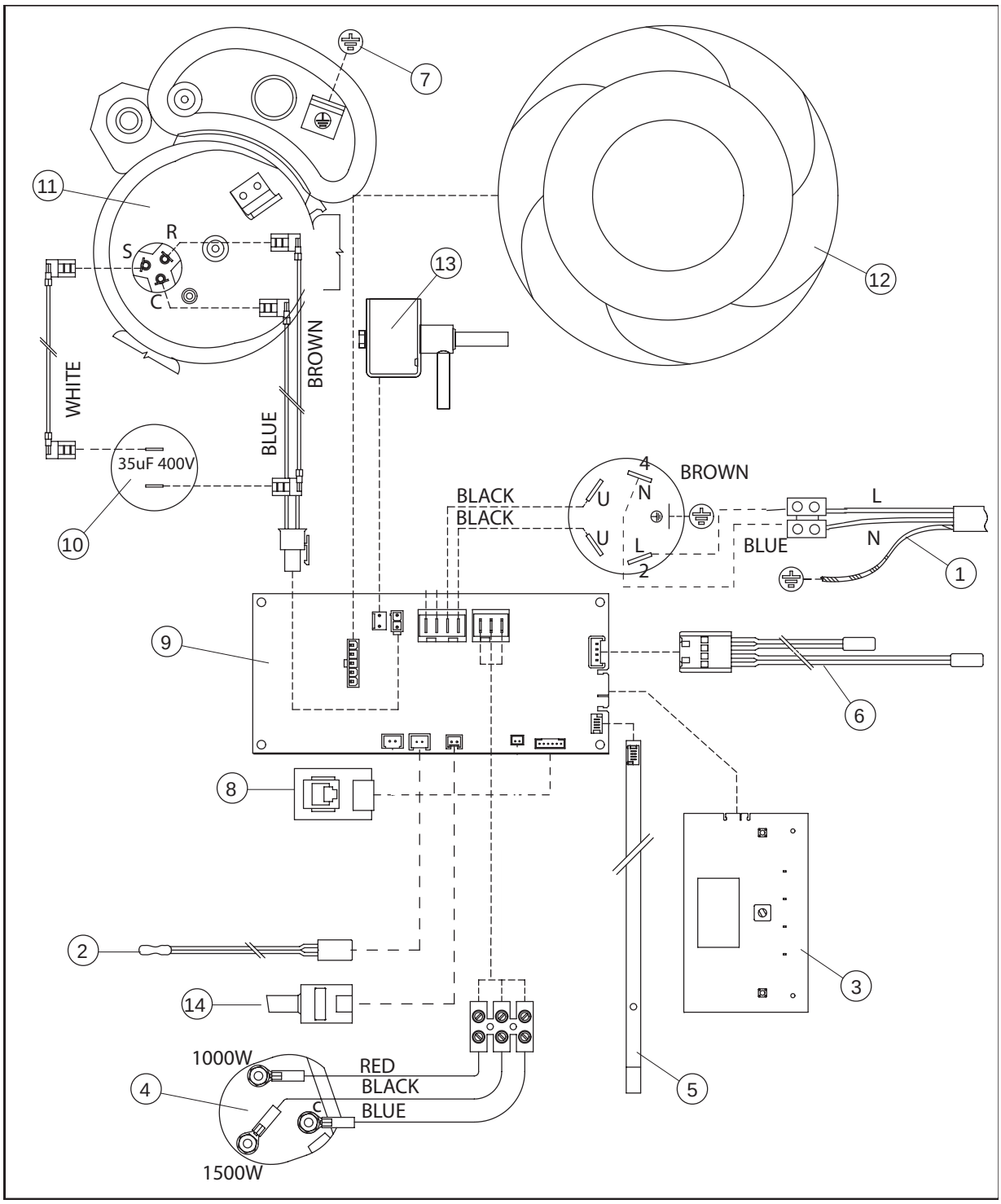
These are a statutory document and take priority over all other regulations and recommendations. The installation of an unvented hot water storage cylinder is classified as a 'Controlled Service' and Regulation G3 applies. To meet the requirements of the Regulation, installation of an unvented system should be undertaken by a 'competent installer'.

All installations of unvented hot water storage systems having a capacity of more than 15 litres should be notified to the relevant Local Authority by means of building notice or by the submission of full plans. It is important to note that it is a criminal offence to install an unvented hot water storage system without notifying the Local Authority. The installation of the unvented cylinder and hot water system must comply with BS 6700 and the HSE Legionella Code of Practice.

## 5.8 IEE Wiring Regulations/ British Standards

The appliance should be installed in accordance with the current versions the IEE Wiring Regulations (now called BS7671 "Requirements for electrical installations")

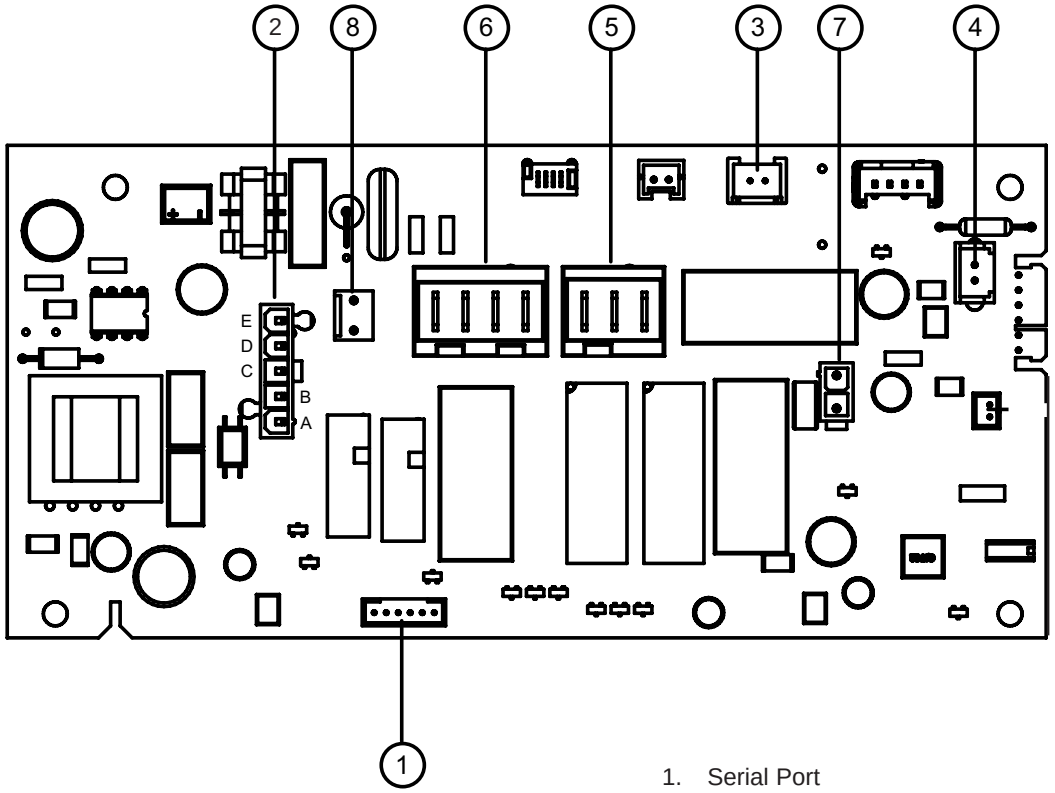
## 5.9 Wiring Layout




1. Power Supply
2. DHW NTC Sensor
3. Interface Board
4. Electric Heater Element
5. Electric Heater NTC Sensor
6. Evaporator & Inlet Air NTC Sensor
7. Cylinder Earth Terminal
8. Serial Port
9. Mainboard
10. Compressor Condenser
11. Compressor
12. Fan
13. Defrost Hot Gas Valve
14. Gas Safety Pressure Switch

*Fig. 5.9a Wiring Layout*

## 5.10 Mainboard Layout




1. Serial Port
2. Fan Connection
   A and B to 12V
   C Earth
   D and E 240V
3. Gas Safety Pressure Switch
4. DHW NTC Sensor Connection
5. Electric Heater Connection
6. Power Supply
7. Compressor Connection
8. Defrost Hot Gas Valve

*Fig. 5.10a Mainboard Layout*

# 6. INSTALLATION

## 6.1 Location of the Appliance

The following list gives guidance to locating the NUOS heat pump.

1. The NOUS must be installed in a dwelling or suitable outhouse, it must not be installed outside and/or where it could be subjected to temperatures below 1°C.
2. The NUOS heat pump is rated as an IPX4. It must not be installed in Bathroom Zone 1. It can be installed in Zone 2, however, the electrical switch must be installed in Zone 3.
3. Units without an air exhaust duct must be installed in rooms with a volume greater than 20m³ and a floor area greater than 8m².
4. The practical limit of 5.12m³ (as stated on page 18) is the minimum room volume the appliance should be installed in, the volume is based on quantity of refrigerant in the system. In the event of a sudden release of refrigerant then the minimum room volume will make it safer for the engineer. Where the room volume is less than the practical limit never fit a self-closing device to the door.

**IMPORTANT**
**Hard Water**
**Where the mains total water hardness exceeds 200 ppm, provision should be made to treat the feed water to reduce the rate of limescale accumulation.**

5. The effects of cooled air entering the room must be considered. The operating temperature range of the appliance is between - 5ºC and 35ºC. Operating the appliance below the minimum temperature compromises the efficiency and can lead to frosting of the heat pump.
6. If the unit is to be installed in a room with a volume of less than 20m³ and/or a floor area less than 8m² then an exhaust duct must be fitted. Also provision must be provided for air to enter the room i.e. vent or air brick. The exhaust can be ducted to outside the dwelling or to another room.
7. **Do not** install the unit in rooms with other appliances that require ambient air; e.g. conventional flue boilers, gas fires and water heaters. (Only applies where air is drawn from a room or internal space).
8. Study the water connections and electric supply and consider the plumbing and wiring layouts for optimum positioning of the unit.
9. The TPRV, PRV discharge pipe and condensate drain pipe must be plumbed to a suitable drain, normally outside the dwelling. The PRV discharge must comply to Building Regulations, *see 6.13.*
10. To function correctly, the unit must be installed with suitable minimum clearances. These are 100mm behind the unit, 400mm to each side and 50mm above, *see fig. 6.16A.*
11. The floor on which the unit is to be standing must be capable of supporting (locally) the weight of the full unit. Do not install the appliance on a chipboard floor.
12. The unit has an electric fan; some vibration and sound is inevitable, some types of floor construction may produce adverse sound levels. A sound reducing pad can be used between the NUOS and the floor, not supplied.

## 6.2 Air Supply

*See examples section 1.13.*

The air supply for the NUOS enters through a round socket at the left hand side of unit. The air could be drawn from within the room or ducted from another room/internal space within the dwelling or more typically from the outside. See 1.8

The minimum volume of the room/space that air is being drawn must have a minimum volume of 20m³. The effects of drawing warm air from the room must be considered.

Do not draw air from rooms containing appliances that require ambient air for combustion, typically conventional flue boilers, water heaters and gas fires.

## 6.3 Exhaust Air

*See examples section 1.8 & 1.14.*

The exhaust air for the NUOS is extracted through a round vent either from the right hand side or top of the unit, this can be terminated internally or be ducted externally. When terminating the exhaust internally it must be remembered that the air exiting the NUOS will be chilled, the effects of this chilling must be considered. The room volume must have a minimum volume of 20m³.

When terminating the exhaust duct to the outside, a termination grille must be installed, but NOT an insect grille.

To prevent any ingress of driving rain the final extension duct must be inclined 1º falling away from the appliance. The remaining duct can be installed horizontally or vertically. The ducting must be adequately supported, a bracket for each extension is recommended.

When terminating the exhaust air to the outside and drawing air from an internal space, an air vent having a minimum free air space of 4000mm² is required to the space where the air is being drawn.

***Important**
**When both inlet and outlet ducts are used these must terminate at least 500mm apart.**

*For details of ducting kits available, consult Ariston.*

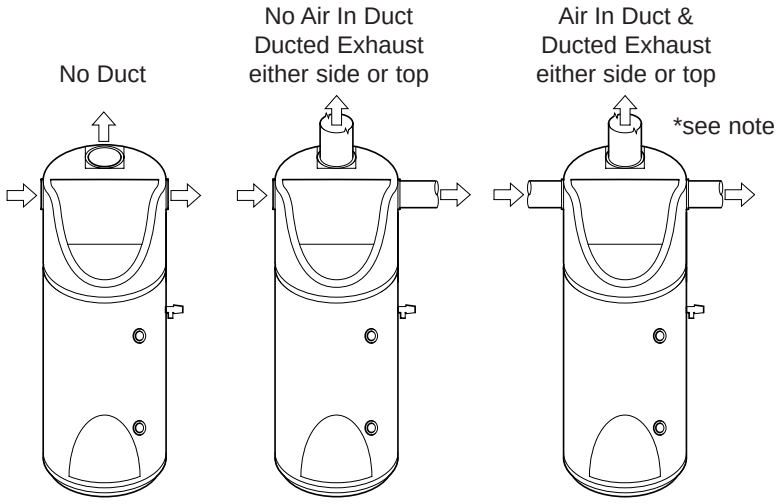
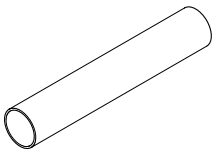
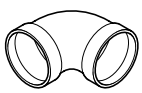
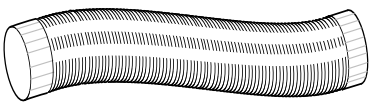



*Fig. 6.3a Typical Ducting Examples*

## 6.4 Air Duct Static Loss

Each duct accessory has a designated static loss value (measured in Pascal (Pa). The combined total of static losses for both exhaust and supply air ducts where applicable must not exceed 70Pa.

See table below for static losses for accessories.

| Component | |  |  |  | | |
|---|---|---|---|---|---|---|
| | | Smooth PVC Duct | Smooth 90º PVC Bend | Flexible Duct Straight | Flexible Duct 90ºC | GRILLE |
| Ø150 | Static Loss (Pa) | 5 Pa/metre | 15 Pa | 9.5 Pa/metre | 7 Pa | 10 Pa |
| | M Equivalent | 1 | 3 | 1.9 | 1.4 | 2 |

## 6.5 Installing Procedure

This gives a suggested step-by-step guide to installing the NUOS unit, more detailed information is included in the following pages.

1. Consider all topics in section 6.1, the Bathroom Zone requirements (when applicable), and then choose a location for the unit.
2. Design pipework layout with the best position for control valves and expansion vessel. Ensure drain off cock on the cold water inlet is at the lowest point below the appliance
3. Design wiring layout, run cables and fit switch/fuse units.

DO NOT TURN POWER ON YET.

4. Carry out pipe installation as far as possible prior to mounting the unit. It is important to flush pipe runs before connecting to the NUOS.
5. Ensure floor under NUOS is sealed against water ingress.
6. Stand NUOS exactly in position and adjust level using adjustable feet.
7. Consider air in and air exhaust duct, if applicable, and mark necessary holes in walls/ceiling.

   Before drilling the wall for air inlet and/or exhaust ducts, ensure the mechanical strength of the wall will not be compromised as a direct result of the holes in the wall.

*When fitting a section of ducting passing through an outside wall it must be inclined slightly, falling away from the appliance to avoid any rain ingress.*

8. Move NUOS away and cover to prevent damage from dust and debris.
9. Make neat holes for ducting as applicable, clean up and reposition NUOS.
10. Secure the feet to the floor through the appropriate holes using suitable screws and rawlplugs; after positioning the appliance, remove the fabric belt by loosening the relative bolts.
11. Complete all pipework and connections to NUOS.
12. When applicable, fit air in and exhaust ducts as required. Ensure ducts are easily detachable from the NUOS to allow access for servicing.
13. Connect NUOS electrical flex to the wall/ceiling switch.

Refer to Commissioning section 7 for completion of installation.

## 6.6 Electrical Connection

The electrical installation must comply with current IEE Wiring Regulations, Health & Safety document no. 635 (Electricity at Work Regulations). (See fig. 6.6A and Wiring Layout fig. 5.9A)

The unit is supplied with a 3 core flex. This should be wired to a 13 amp double pole isolating switch with at least 3mm pole separation with both electrical and mechanical indicators.

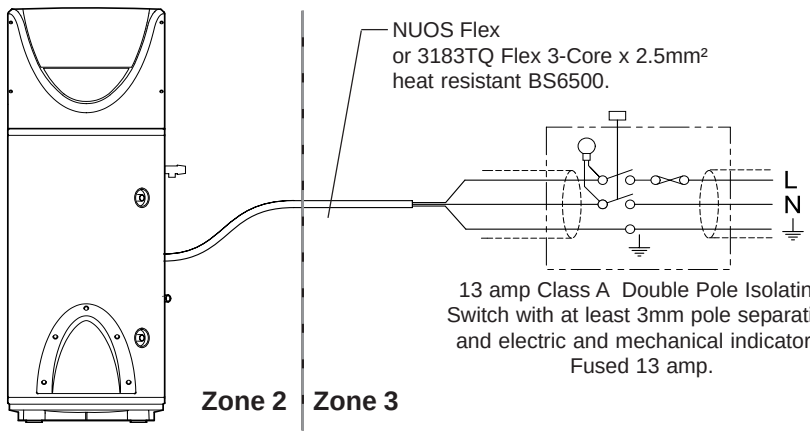



*Fig. 6.6A Electrical Connection*

## 6.7 Bathroom Zones

The NUOS appliance is rated @ IPX4.

The NUOS unit can be installed in Zone 2 and Zone 3. However, the switch/fuse unit must be installed in Zone 3.

*The NUOS can be installed in a bathroom, however, a bathroom would not be the most suitable location.*

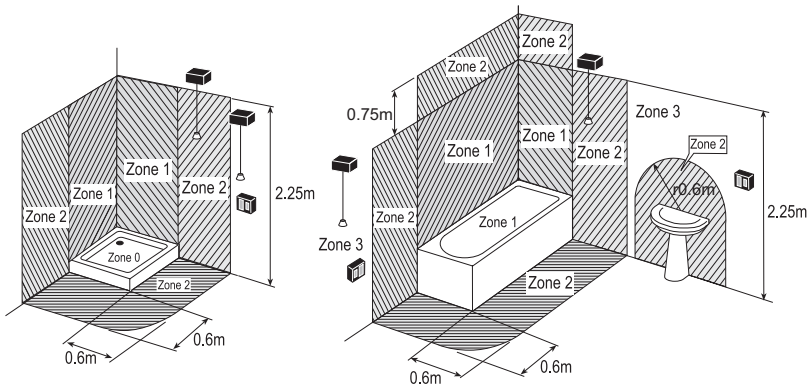



*Fig. 6.7a Bathroom Zones*

## 6.8 Combination Valve

The combination valve can be installed in any orientation.

The pipework must be flushed prior to fitting the valve to avoid damage to the valve.

**WARNING**
**No valves must be fitted between the combination valve and the NUOS.**

**WARNING**
**No valves must be fitted from the combination valve to the expansion vessel or PRV discharge.**

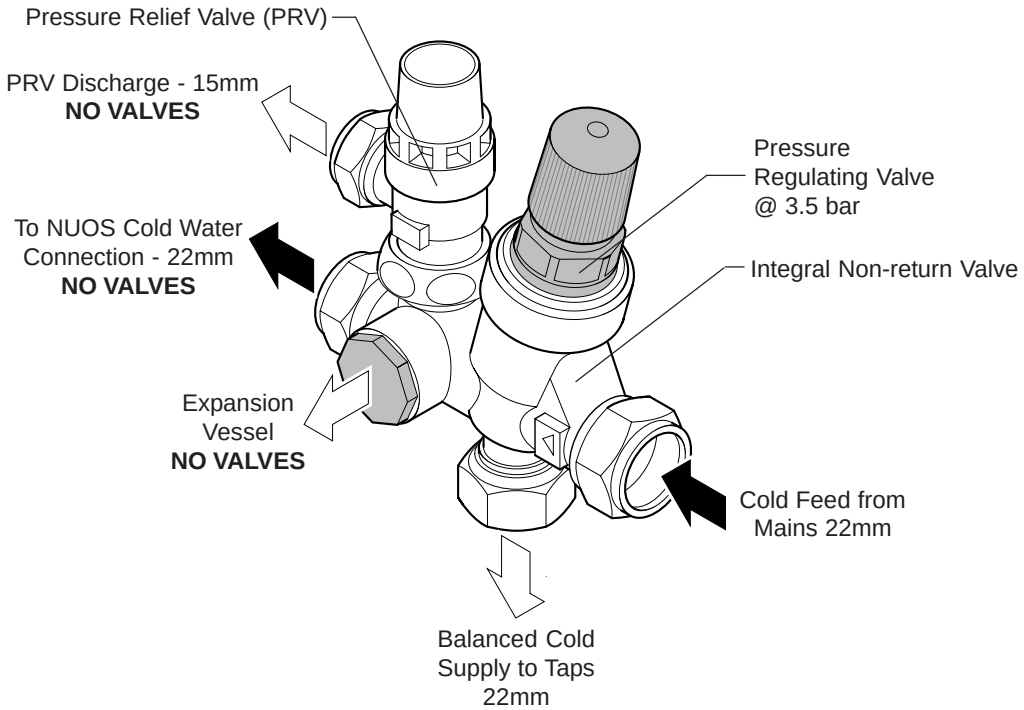



*Fig. 6.8a Combination Valve*

## 6.9 Water Connections

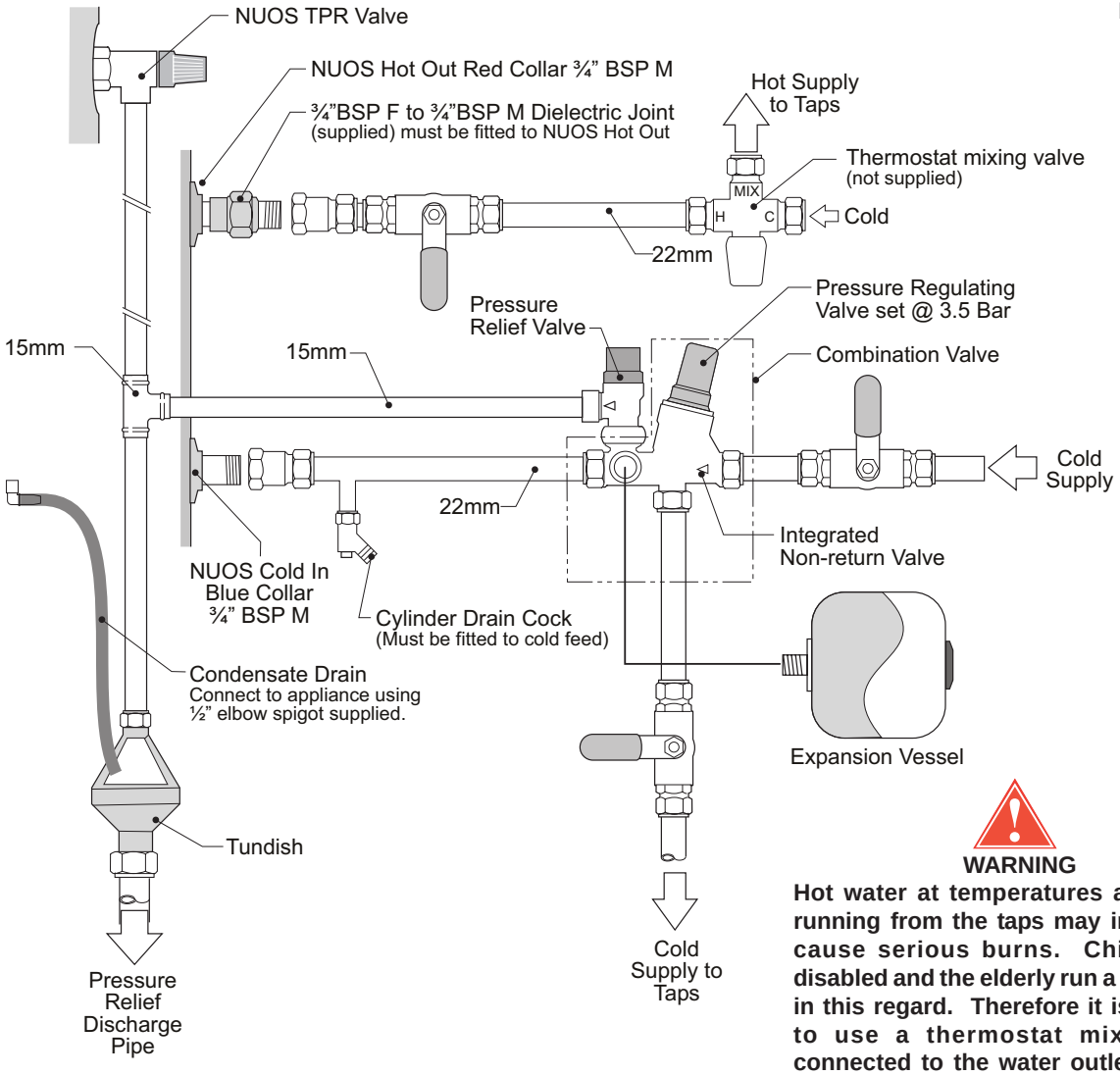



*Fig. 6.9a Water Connections Schematic*

## 6.10 Expansion Vessel Installation

DO NOT install expansion vessel vertically with connection at the bottom (A).

DO NOT connect via a vertical pipe above the combination valve (B).

DO NOT use flexible hoses (C).

Installing EV incorrectly can cause air to become trapped in the expansion vessel resulting in potential nuisance vibration through the NUOS and pipework.

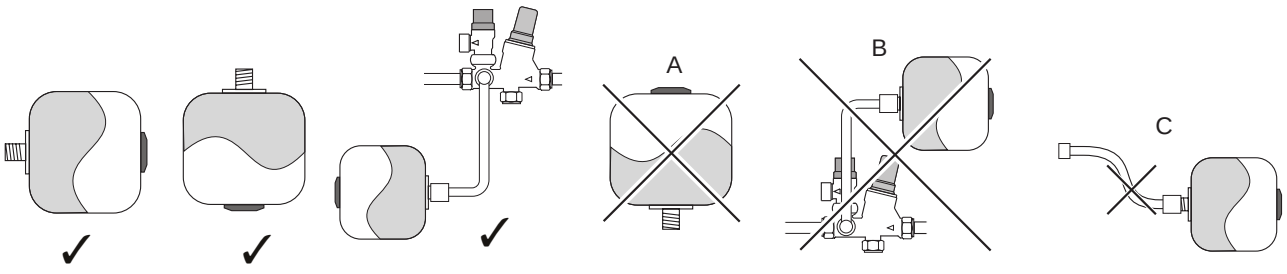



*Fig. 6.10a Expansion Vessel Installation*

Not to scale

## 6.11 FSi 250 Indirect Coil Solar Connection

The NUOS FSi 250 has an indirect coil that is intended for connection to a water heating system, such as a solar system as shown below.

A manual reset overheat stat is supplied fitted to the NUOS.

For solar installations this stat should be wired so that in the event of overheating from the solar system the thermostat switches the solar pump Off, thus preventing flow to the NUOS.

The overheat setting for the stat should be set at a maximum temperature 70°C.

*Note:*
*Where secondary return circuits are used an additional expansion vessel may be required.*

*As the heat pumps condenser coil is positioned below the indirect coil, the NUOS 250i does not have a dedicated solar volume.*

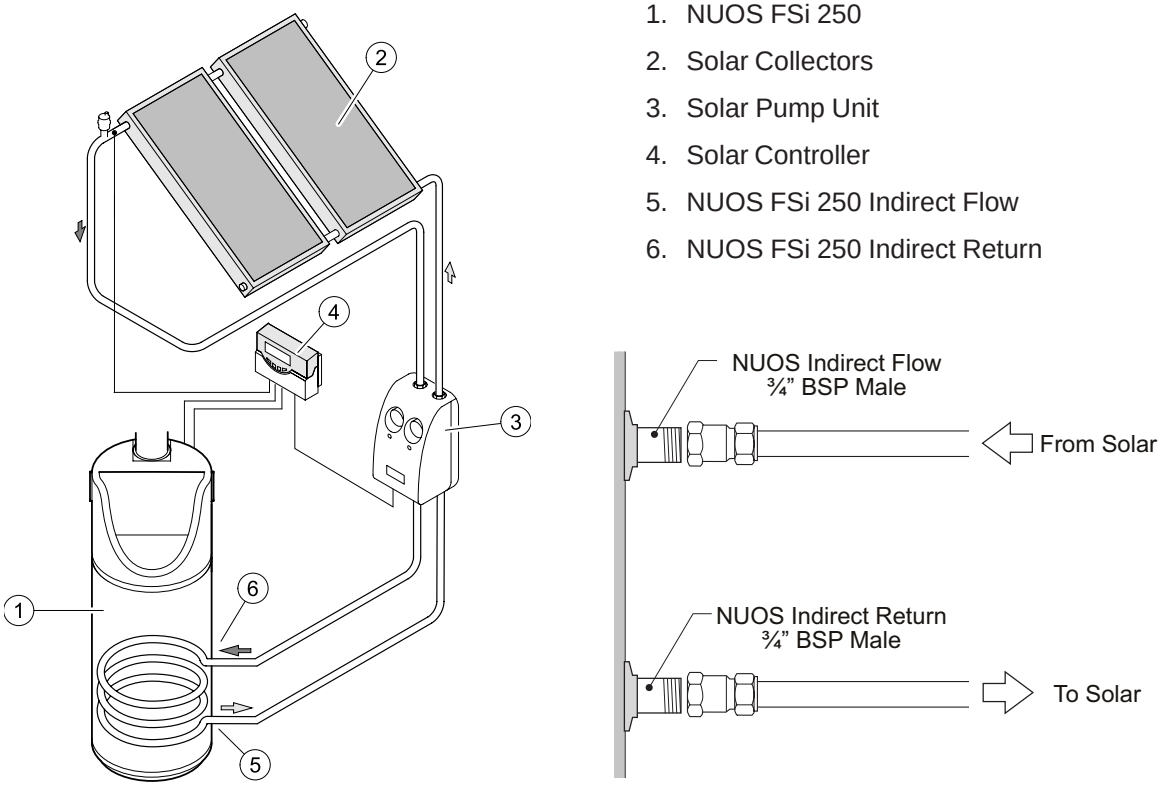
**GENERAL GUIDANCE**

Current guidance notes do not cover the connection of a solar thermal circuit to an unvented storage vessel (cylinder). However, if guidance is sought for compliance with current regulations the fundamental principle is to provide a failsafe means of shutting off the solar input to the heat exchanger if the cylinder temperature should rise above the set temperature of the cylinder's energy cut out. (See Note 1).

As with all unvented hot water systems, notification of intention to install should be given to your local building control.

***Option A.*** A non self resetting mechanical shut-off should be installed on the solar primary flow to the cylinder. The mechanical shut-off should be suitable for use with a solar primary circuit (i.e. high temperature and glycol resistant). The mechanical shut-off should be integrated electrically with the cylinder energy cut out/s and if necessary the solar circuit temperature control, please refer to the solar controller manufacturer for further information.

***Option B.*** Where the solar controller and hydraulic system demonstrate that by no lesser means the requirement in Option A is satisfied by other means; certification by an approvals body is required to demonstrate that




1. NUOS FSi 250
2. Solar Collectors
3. Solar Pump Unit
4. Solar Controller
5. NUOS FSi 250 Indirect Flow
6. NUOS FSi 250 Indirect Return

***Fig. 6.11a NUOS FSi 250 with Typical Solar Connection***

in the event of the stored water going over temperature, the heat input to the cylinder is isolated by physical means and is non self resetting. These systems should be clearly identified with reference to the approvals body. (See Note 2)

*Note 1 :Whilst most solar cylinders use a coil type heat exchanger other options such as external plate to plate devices , external annulars or 'tank in tank' systems may be used but the same control options always apply.*

*Note 2 :Current approved bodies include the British Board of Agreement (BBA) , WRc-NSF Limited, or KIWA*

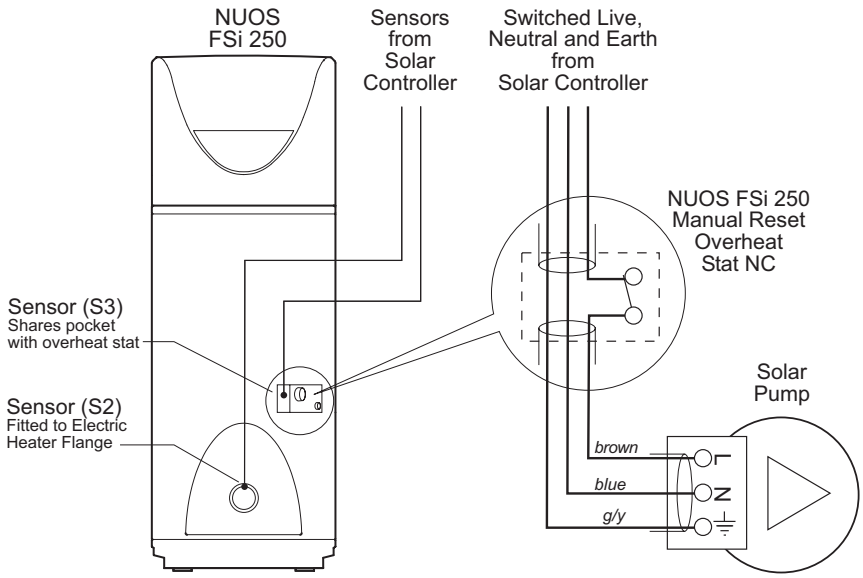



***FIG. 6.11B NUOS FSi 250 OVERHEAT STAT WIRING (TYPICAL)***

## 6.12 FSi 250 Indirect Coil Boiler Connection

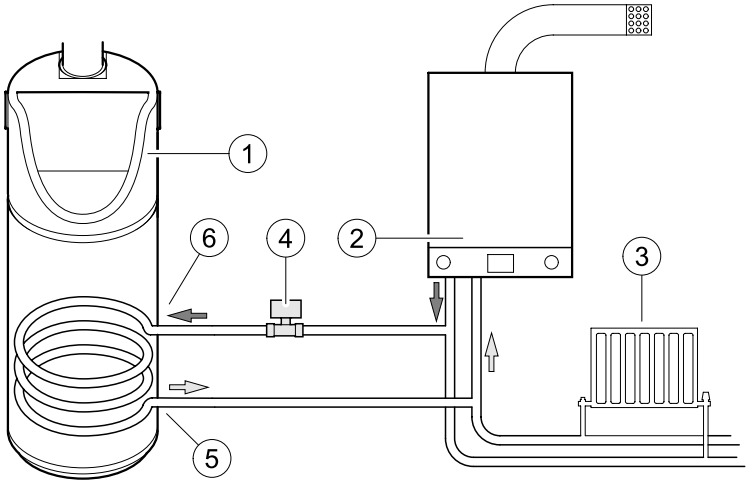
*Note:*
*Where secondary return circuits are used an additional expansion vessel may be required.*

The NUOS FSi 250 has an indirect coil that is intended for connection to a water heating system, such as a boiler as shown below.

A manual reset overheat stat is supplied fitted to the NUOS.

This stat should be wired so that in the event of over temperature in the NUOS's hot water system the thermostat breaks the electrical supply to the motorised valve which in turn mechanically closes preventing primary water entering the coil.

The overheat setting for the stat should be set at a maximum temperature 70°C.




1. NUOS FSi 250
2. Boiler
3. Heating System
4. Motorised Valve
5. NUOS FSi 250 Indirect Flow
6. NUOS FSi 250 Indirect Return

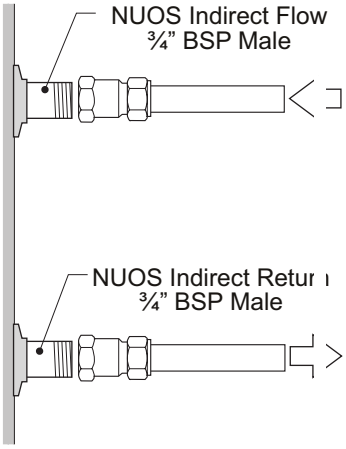



*Fig. 6.12a NUOS FSi 250 with Typical Boiler Connection*

## 6.13 TPRV & PRV Discharge

The discharge from the cylinder TPRV and combination PRV must be plumbed to the tundish and should not be used for any other purpose.

The tundish must be vertical and fitted within 750mm of the pressure relief valve and must be located with the NUOS. The tundish must be in a position visible to the occupants, and positioned away from any electrical devices. The discharge pipe from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge, and be made of a suitable material in line with Building Regulation G3 (preferably metal).

The tundish must not be located near or above electrical components, switches or junction boxes.

## 6.14 TPRV and PRV Discharge Pipes - To Gully

**The discharge pipes from safety devices (tundish) must be installed to fully comply with Part G3 of the Building Regulations (latest edition).**

The following text, and diagram 1 are reproduced from G3 Building Regulations 2010 (as amended) Draft.

**WARNING**
**Scalding water and steam can be blown out of the discharge pipe. Position the discharge so that it is not a hazard to property or people (especially children).**

## 6.15 Building Regulations G3

The following text in the shaded area is reproduced from the Building Regulations. It is included here for reference only.

**Discharge pipes from safety devices**

**Discharge pipe D1**

**3.49** Each of the **temperature relief valves** or **combined temperature and pressure relief valves** specified should discharge either directly or by way of a manifold via a short length of metal pipe (D1) to a **tundish.**

**3.50** The diameter of discharge pipe (D1) should be not less than the nominal outlet size of the **temperature relief valve.**

**3.51** Where a manifold is used it should be sized to accept and discharge the total discharge from the discharge pipes connected to it.

**3.52** Where valves other than the **temperature and pressure relief valve** from a single unvented hot water system discharge by way of the same manifold that is used by the safety devices, the manifold should be factory fitted as part of the **hot water storage system unit** or package.

**Tundish**

**3.53** The **tundish** should be vertical, located in the same space as the unvented **hot water storage system** and be fitted as close as possible to, and lower than, the valve, with no more than 750mm of pipe between the valve outlet and the **tundish** (see Diagram 1).

**Note:** To comply with the Water Supply (Water Fittings) Regulations, the **tundish** should incorporate a suitable air gap.

**3.54** Any discharge should be visible at the **tundish**. In addition, where discharges from safety devices may not be apparent, e.g. in dwellings occupied by people with impaired vision or mobility, consideration should be given to the installation of a suitable safety device to warn when discharge takes place, e.g. electronically operated.

**Discharge pipe D2**

**3.55** The discharge pipe (D2) from the **tundish** should:

a. have a vertical section of pipe at least 300mm long below the **tundish** before any elbows or bends in the pipework (see Diagram 1); and

b. be installed with a continuous fall thereafter of at least 1 in 200.

**3.56** The discharge pipe (D2) should be made of:

a. metal; or

b. other material that has been demonstrated to be capable of safely withstanding temperatures of the water discharged and is clearly and permanently marked to identify the product and performance standard (e.g.) as specified in the relevant part of BS 7291).

**3.57** The discharge pipe D2 should be at least one pipe size larger than the nominal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9m long, i.e. for discharge pipes between 9m and 18m the equivalent resistance

length should be at least two sizes larger than the nominal outlet size of the safety device; between 18 and 27m at least 3 sizes larger, and so on; bends must be taken into account in calculating the flow resistance. See Diagram 1, Table 1 and the worked example.

**Note:** An alternative approach for sizing discharge pipes would be to follow Annex D, section D.2 of BS 6700:2006 Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

Diagram 1 **Typical discharge pipe arrangement**

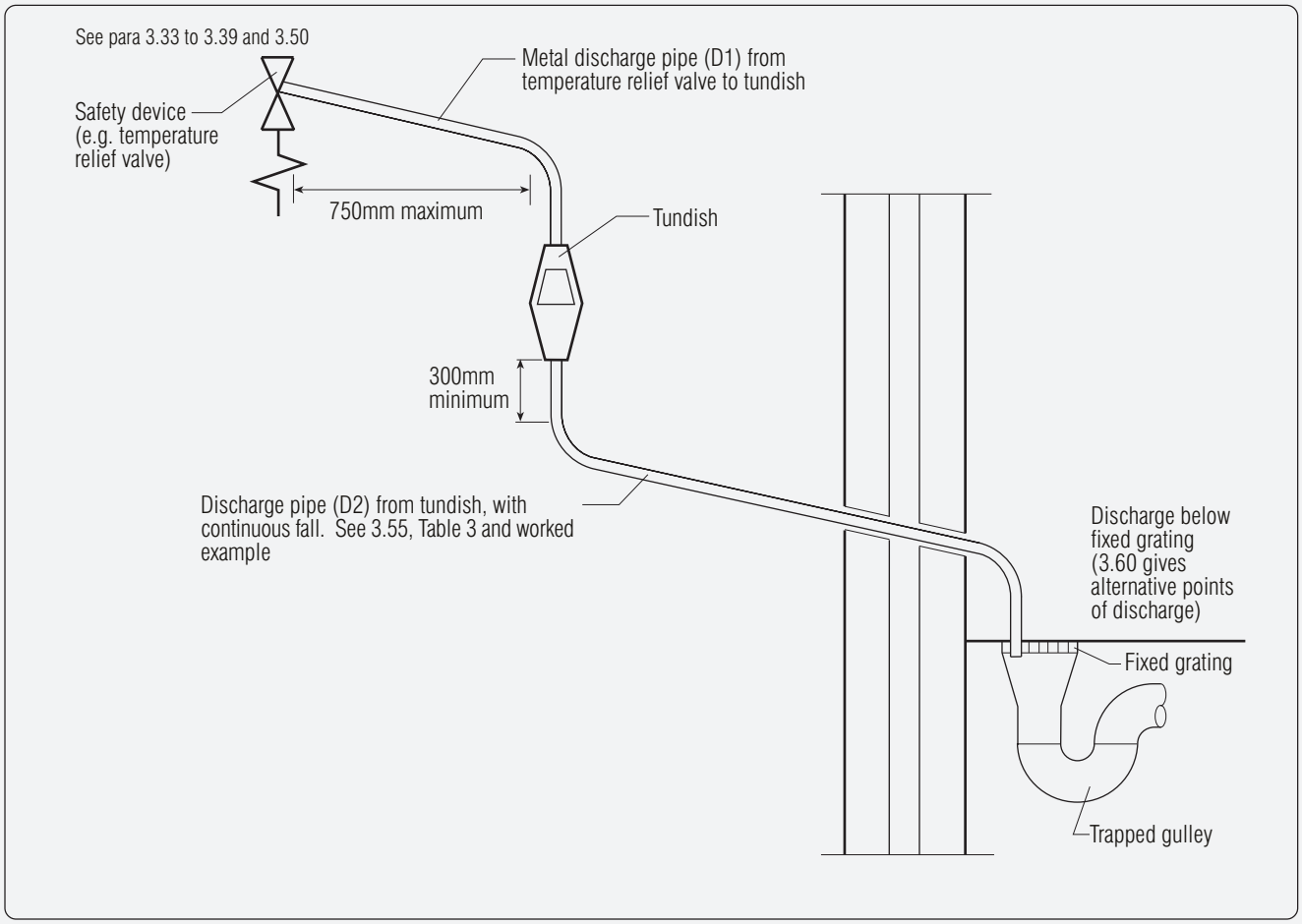

See para 3.33 to 3.39 and 3.50
Metal discharge pipe (D1) from temperature relief valve to tundish
Safety device (e.g. temperature relief valve)
750mm maximum
Tundish
300mm minimum
Discharge pipe (D2) from tundish, with continuous fall. See 3.55, Table 3 and worked example
Discharge below fixed grating (3.60 gives alternative points of discharge)
Fixed grating
Trapped gulley

Table 1 **Sizing of copper discharge pipe 'D2' for common temperature relief valve outlet sizes**

| Valve outlet size | Minimum size of discharge to Tundish (**D1**)* | Minimum size of discharge pipe from Tundish (**D2**)* | Maximum resistance allowed expressed as a length of straight pipe, i.e. no elbows or bends | Resistance created by each elbow or bend |
|---|---|---|---|---|
| G ½ | 15 mm | 22 mm<br>28 mm<br>35 mm | up to 9 m<br>up to 18 m<br>up to 27 m | 0.8 m<br>1.0 m<br>1.4 m |
| G ¾ | 22 mm | 28 mm<br>35 mm<br>42 mm | up to 9 m<br>up to 18 m<br>up to 27 m | 1.0 m<br>1.4 m<br>1.7 m |
| G 1 | 28 mm | 35 mm<br>42 mm<br>54 mm | up to 9 m<br>up to 18 m<br>up to 27 m | 1.4 m<br>1.7 m<br>2.3 m |

**See 3.49 and 3.56 and Diagram 1*
***Note:** The above table is based on copper tube. Plastic pipes may be of different bore and resistance. Sizes and maximum lengths of plastic should be calculated using data prepared for the type of pipe being used.*

**Worked Example**
The example below is for a G½ 6 with a discharge pipe (D2) having 4 No. 22mm elbows and length of 7m from the **tundish** to the point of discharge.

From Table 1:

Maximum resistance allowed for a straight length of 22mm copper discharge pipe (D2) from a G½ **temperature relief valve** is: 9.0m

Subtract the resistance for 4 No. 22mm elbows at 0.8m each = 3.2m

Therefore the maximum permitted length equates to: 5.8m which is less than the actual length of 7m therefore calculate the next largest size.

Maximum resistance allowed for a straight length of 28mm copper discharge pipe (D2) from a G½ **temperature relief valve** is: 18m

Subtract the resistance for 4 No. 28mm elbows at 1.0m each = 4m

Therefore the maximum permitted length equates to: 14m

As the actual length is 7m, a 28mm (D2) copper pipe will be satisfactory.

**3.58** Where a single common discharge pipe serves more than one system, it should be at least one pipe size larger than the largest individual discharge pipe (D2) to be connected.

**3.59** The discharge pipe should not be connected to a soil discharge stack unless it can be demonstrated that the soil discharge stack is capable of safely withstanding temperatures of the water discharged, in which case, it should:

a. contain a mechanical seal, not incorporating a water trap, which allows water into the branch pipe without allowing foul air from the drain to be ventilated through the **tundish**;

b. be a separate branch pipe with no **sanitary appliances** connected to it;

c. if plastic pipes are used as branch pipes carrying discharge from a safety device they should be either polybutalene (PB) to Class S of BS 7291-2:2006 or cross linked polyethylene (PE-X) to Class S of BS 7291-3:2006; and

d. be continuously marked with a warning that no **sanitary appliances** should be connected to the pipe.

## 6.16 NUOS Expansion Discharge

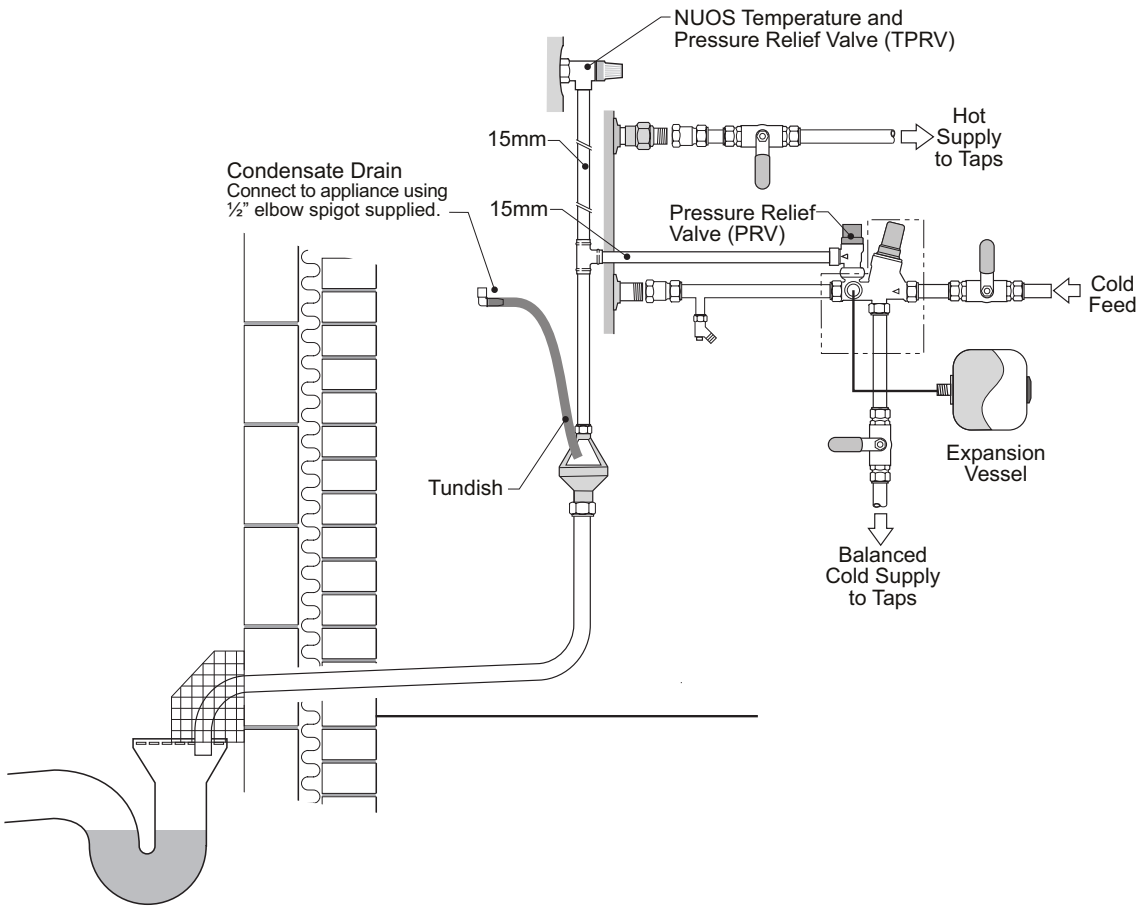



*Fig. 6.16a Typical Expansion Discharge Arrangement* Not to scale

## 6.17 Supporting Floor

The floor should be capable of fully supporting the NUOS.

Uneven and less sturdy floors should be bolstered using a thick exterior plywood base spanning joists.

Ensure floor under NUOS is sealed against water ingress.

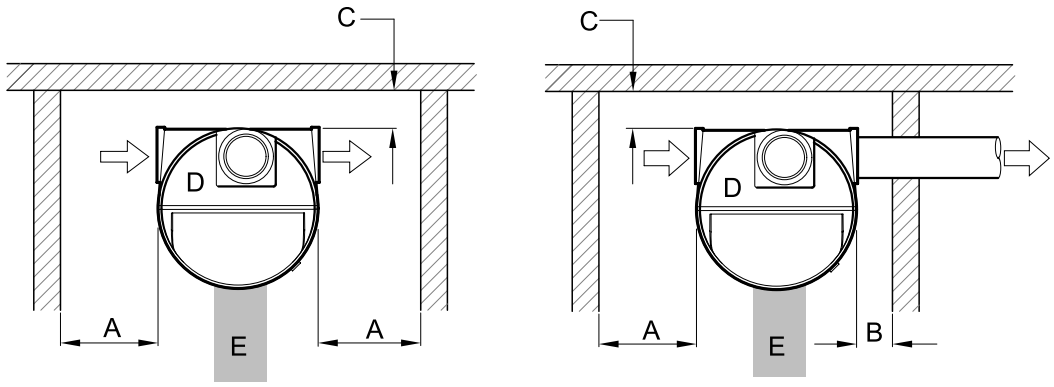
## 6.18 Positioning the Unit

**Ensure adequate clearance for all pipework, fittings and electrical work.**

Check all plumbing and cable routes are satisfactory.

If installed in a bathroom, check that the unit is not within any part of the Bathroom Zone 1. It can be in Zone 2 or 3. The switch/fuse units must not be in Zone 2.

Ensure that there is adequate clearance all round the unit for air circulation and maintenance, see fig. 6.18A.




| | Operational | Servicing | Clearance |
|---|---|---|---|
| A | 400mm | 400mm | Required minimum clearance when no duct is used. Inlet and side exhaust and top exhaust. |
| B | 100mm | 300mm | Suggested minimum clearance when duct is used. Inlet and side exhaust and top exhaust. |
| C | 100mm | 300mm | Suggested minimum rear clearance. |
| D | 50mm | 400mm | Minimum above unit when no duct is fitted. |
| E | 400mm | 400mm | Service clearance required for electric heater. |

*Fig. 6.18A Recommended Operational and Servicing Clearances*

## 6.19 Levelling the Unit

It is essential that the unit is level both horizontally and vertically; this is to ensure that any condensation that is created in the upper compartment drains down through the condensate drainpipe.

Four adjustable feet are provided for levelling.

## 6.20 Fixing the Unit

The four feet have holes that enable the unit to be screwed to the floor, use stainless steel screws and suitable rawl plugs (not supplied).

## 6.21 Condensate Outlet

The unit will produce condensation. Ensure that the condensate outlet is safely discharged. See 6.9A & 6.16A

## 6.22 Filling the System

1. Check all pipework connections have been made.
2. Check PRV discharge pipes and tundish are correctly fitted.
3. Check all pipe connections are tight and no joints have been left unsoldered.
4. Check power is off.
5. Check wiring connections have been made.
6. Turn all isolating valves off.
7. Turn all the taps off.
8. Check any drain plugs fitted are closed.
9. Turn on mains water, allow system to fill up to first isolating valve. Turn on a hot tap. Open isolating valves and allow the NUOS to fill and let water pass through the system to the open hot tap, this will expel most of the air from the system and fill the NUOS vessel.
10. Close the hot tap.
11. Check for leaks.

## 6.23 Draining the NUOS Cylinder Unit

Typical drain arrangement and system designs will vary.

1. Turn power off to ensure NUOS is not operated when empty.
2. Turn off cold supply to NUOS.
3. Shut off hot water feed from NUOS.
4. Connect hose to drain cock and place other end in sink, basin etc.
5. Open drain cock and open TPR valve to vent cylinder.

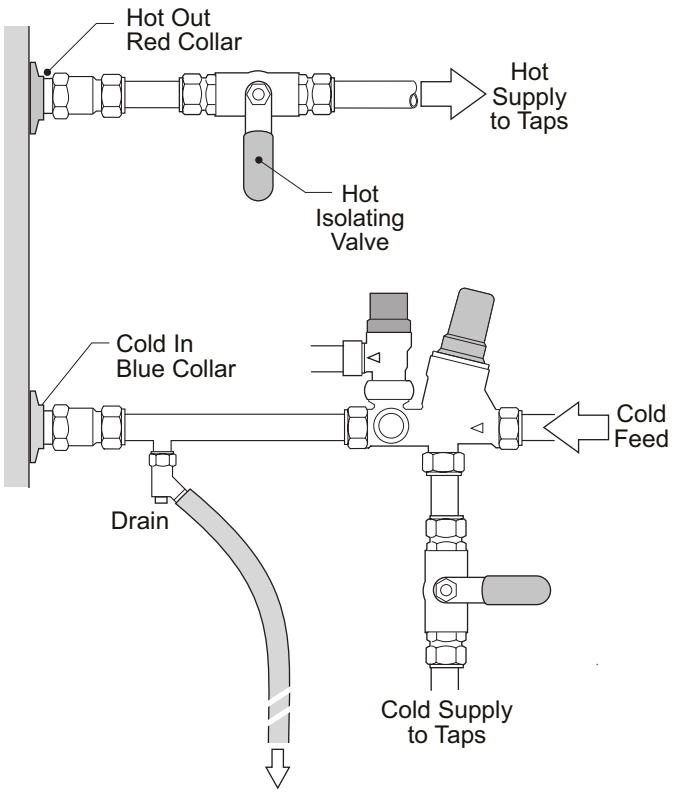



*Fig. 6.23a NUOS Cylinder Drain*

# 7. COMMISSIONING SYSTEM

**IMPORTANT**
**It is the responsibility of the installer to ensure that the system is properly commissioned.**

The Commissioning Procedure should be carried out in 7 stages.

- ☐ Stage 1 Electrical Check
- ☐ Stage 2 Pre-fill Check
- ☐ Stage 3 Filling System
- ☐ Stage 4 Drain System
- ☐ Stage 5 Cleaning The System
- ☐ Stage 6 Setting and Testing Controls
- ☐ Stage 7 Handing Over

## 7.1 COMMISSIONING PROCEDURE

STAGE 1 - ELECTRICAL CHECK

**1.1 CHECK THAT ALL WIRING INCLUDING EARTH WIRING, HAS BEEN INSTALLED CORRECTLY, CONFORMS TO CURRENT REGULATIONS AND A SATISFACTORY ELECTRICAL TEST AND INSPECTION CERTIFICATE HAS BEEN COMPLETED.**

**1.2 CHECK ALL ELECTRICAL COVERS ARE CORRECTLY FITTED.**

1.3 Check Tundish is positioned so that any spillage or spray from the Tundish would not contact any electrical components.

1.4 Check ALL wiring connections have been made.

1.5 Remove top cover and check:-

i Electrical terminal cover is fitted.

ii Sensors are in the correct place.

iii No tools or fittings are left in the compartment.

Refit cover.

1.6 Check the required earth continuity conductors have been fitted.

STAGE 2 - PRE-FILL CHECK

2.1 Check expansion vessel is fitted and that no valves are fitted between the expansion vessel and the combination valve.

2.2 Check that no valves are fitted between NUOS and the combination valve.

2.3 Check the PRV, tundish and discharge pipes are correctly installed to conform to the Building Regulations G3.

2.4 Check all pipe connections are tight and no joints have been left unsoldered.

2.5 Check ALL drain cocks are closed.

STAGE 3 - FILLING SYSTEM

3.1 Close all isolating valves.

3.2 Close all taps

3.3 Open the incoming water mains stopcock.

3.4 Turn on mains water, allow system to fill up to first isolating valve. Turn on hot tap. Open isolating valves and allow the NUOS to fill and let water pass through the system to the open hot tap, this will expel most of the air from the system and fill the NUOS vessel.

3.5 Systematically open all hot and cold taps to purge air.

3.6 Check system for leaks.

3.7 Check no water is discharging from any TPRV or PRV.

3.8 Expansion vessel - with the water supply turned off and taps open, check expansion vessel pressure and top up as necessary.

3.9 Cylinder TPRV - check its operation; with the water supply on, turn the TPRV test knob and check water discharges to tundish, ensure the valve closes after testing.

3.10 Combination Valve PRV - check its operation; with the water supply on, turn the PRV test knob and check water discharges to tundish, ensure the valve closes after testing.

3.11 Discharge pipe (D1) - open either TPRV or PRV gradually to produce a full bore discharge into tundish and D2 and check there is no back pressure, and that the water flows freely to drain.

3.12 Pressure Reducing Valve (PRV) - check that the correct outlet pressure is being maintained by measuring the pressure at an in-line terminal fitting e.g. a tap.

STAGE 4 - DRAIN SYSTEM

4.1 Turn off incoming mains stop cock.

4.2 Using hose and suitable containers, drain all water from the cylinder and pipework using drain cocks.

4.3 Remove and clean in-line strainer of combination valve.

STAGE 5 - CLEANING THE SYSTEM

5.1 Using proprietary chlorination product, chlorinate the domestic hot water system as per manufacturer's instructions.

5.2 Drain the system as 5.2, then fill and drain to flush as many times as recommended by the chlorination product manufacturer.

5.3 Refill system.

STAGE 6 - SETTING AND TESTING CONTROLS

6.1 Switch on NUOS electric isolating switch.

**CAUTION**
**Do not switch on power to the appliance until it has been installed in its vertical position for at least 3 hours.**

6.2 For commissioning use the factory default settings, no changes to parameters should be required.

6.3 Set NUOS into operation, and when hot check for leaks.

6.4 Check operation of any open flue appliances that could be affected by air movement through the NUOS.

6.5 Test operation of boost button.

6.6 Fill in details in the Benchmark Logbook.

STAGE 7 - HANDING OVER

7.1 Complete the Benchmark Logbook.

7.2 The Installer should re-check the system and ensure it is completely satisfactory before demonstrating to the end user.

*NOTE*
*For operating instructions, see section 3.*

7.3 The end user should be aware of the following:-

1. The most cost effective use of the NUOS system using the economy settings.
2. How to set the temperature of the tap hot water.
3. How to set 'Voyage' and other optional modes.
4. The function of the combination valve's PRV and that over pressure will cause steam and scalding water to be emitted from the discharge pipes.
5. That the tundish is supplied as a visual identification for over pressure.
6. The procedure to follow in the event of over pressure.

**This manual and supplements must be left with the end user together with the Benchmark Logbook.**

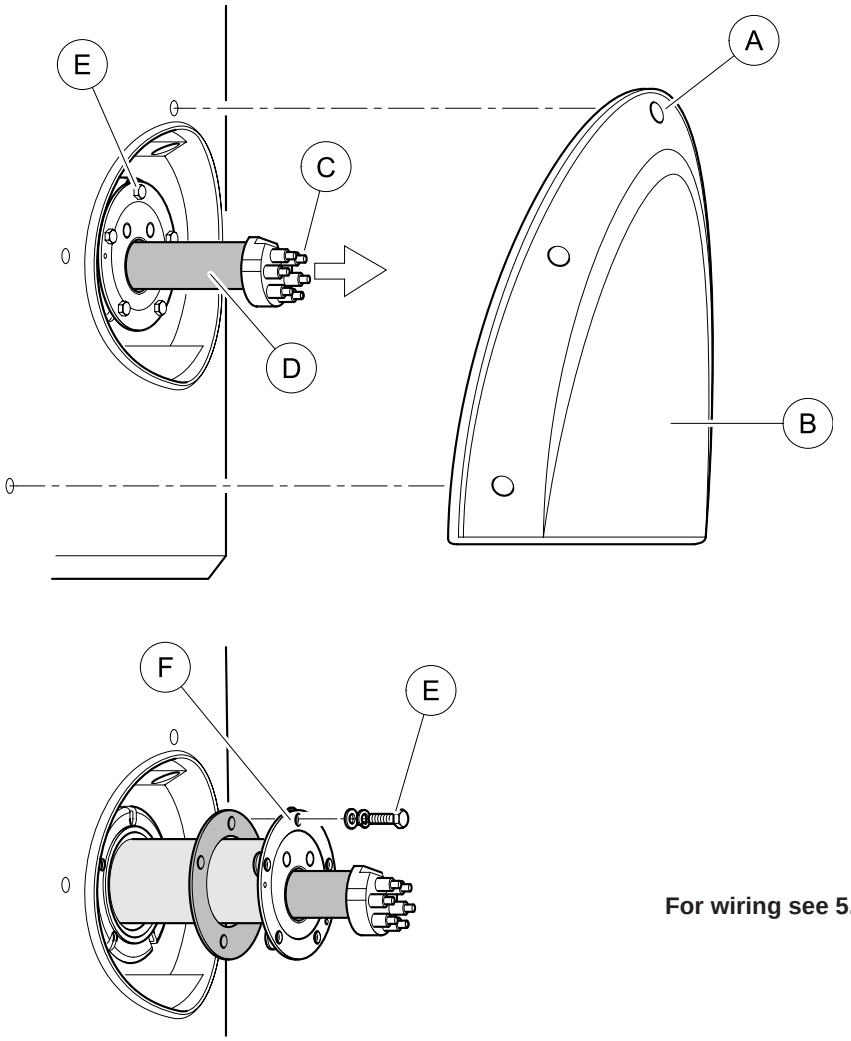
# 8. MAINTENANCE

**WARNING**
**Where the room volume is less than the practical limit (see 5.2, page 18) always ensure that the door to the room does not have a self-closing device before proceeding with any maintenance.**

## 8.1 Removing & Replacing Electric Heater Element

In the event of the electric heater failing or to replace its anode, the electric heater has to be removed from the NUOS.

Only replace with approved Ariston parts.




**For wiring see 5.9**

*Fig. 8.1A Electric Heater Element*

**CAUTION**
**Removing flange screws E will release the stored water.**

Removal Procedure for Inspection

Refer to fig. 8.1A.

1. Isolate mains electrical supply to the NUOS by switching off and removing fuse.
2. Unscrew 5 screws (A) and remove cover (B).
3. Disconnect wires and withdraw heating element (C).
4. Replace element and refit, ensure wires are connected correctly.

To descale flange (F) or to replace the magnesium anode the flange (F) has to be removed by removing 5 bolts (E), this necessitates draining the cylinder - see 6.20.

## 8.2 Routine Maintenance

*Note:*
*The inclusion of a water softener on the supply to the NUOS may cause the sacrificial anode to rapidly deplete. It may therefore be necessary to replace the anode more regularly.*

The following procedure should be carried out to ensure the efficient operation of the NUOS.

1. Check operation of the electric heater element.

   Check anode every year and replace as required depending on its deterioration - see note.

2. Remove top cover and brush and vacuum enclosure. Clean evaporator and fan removing all dust etc. from it's fins, using a vacuum cleaner in 'blow' mode is ideal.

3. Clean air ducts and grilles (where applicable).

4. Clean casing with non-abrasive household cleaner.

5. Remove control panel cover and carefully blow out dust and debris. Check cable connections are sound.

6. With the water supply turned off remove the strainer from the combination valve and clean off any debris and rinse in water.

7. Expansion vessel - with the water supply turned off and taps open, check expansion vessel pressure and top up as necessary.

8. Cylinder TPRV - check its operation; with the water supply on, turn the TPRV test knob and check water discharges to tundish, ensure the valve closes after testing.

9. Combination Valve PRV - check its operation; with the water supply on, turn the PRV test knob and check water discharges to tundish, ensure the valve closes after testing.

10. Discharge pipe (D1) - open either TPRV or PRV gradually to produce a full bore discharge into tundish and D2 and check there is no back pressure, and that the water flows freely to drain.

11. Pressure Reducing Valve (PRV) - check that the correct outlet pressure is being maintained by measuring the pressure at an in-line terminal fitting e.g. a tap.

## 8.3 Error Codes

| Error Code | Cause | Heating Element Operation | Heat Pump Operation | What to do |
|---|---|---|---|---|
| E1 | Heating occurs without any water in the water tank | OFF | OFF | Turn off the appliance.Verify the causes of the lack of water (leakage, faulty hydraulic connections, etc.). |
| E2 | Excessive temperature of the water in the tank | OFF | OFF | Turn the appliance off then wait until the water temperature decreases; if the problem persists, contact technical advice* |
| E4 | Sensor fault - heating element zone | OFF | OFF | Check or replace the heating element zone sensors, if necessary. |
| E5 | Excessive difference between the temperatures of the heating element zone sensors | OFF | OFF | Check or replace the sensors, if necessary |
| H1 | Excessive pressure on the refrigeration circuit, or faulty reading of the pressure switch | ON | OFF | Try to restart the device; if error persists contact technical advice* |
| H2 | Circuit in low pressure or fan fault | ON | OFF | Turn off the appliance. Check that the fan is not broken and that the evaporator is not obstructed. Check whether the hot gas valve functions properly and replace it if necessary. Check the grids and ducts are not blocked and are clear. |
| H3 | Compressor fault or gas leak | ON | OFF | Turn off the appliance. Check that the evaporator is not obstructed. Verify whether the wirings and the compressor functions properly and/or check for any refrigerant gas leakages. Check or replace the evaporator sensor. Check the grids and ducts are not blocked and are clear. |
| H4 | Evaporator obstructed | ON | ON | Turn off the appliance. Check that the evaporator is not obstructed. Check the grids and ducts are not blocked and are clear. |
| H5 | Fan fault | ON | OFF | Turn off the appliance. Verify that there are no physical impediments to the movement of fan blades, check the wiring of connection with circuit boards. |
| H6 | Air sensor fault | ON | OFF | Check the proper connection of the probe cable between the two units. Verify whether the sensor is properly connected and positioned and replace it if necessary. |
| H7 | Evaporator sensor fault | ON | OFF | Check the proper connection of the probe cable between the two units. Verify whether the sensor is properly connected and positioned and replace it if necessary. |
| H8 | Hot water sensor fault | ON | OFF | Check whether the sensor is properly connected and positioned and replace it if necessary. |
| H9 | Active defrost fault | ON | OFF (if air temperature is below 5°C) | Check that the fan is not broken and that the evaporator is not obstructed. Check whether the hot gas valve functions properly and replace it if necessary. Check the grids and ducts are not blocked and are clear. |
| F1 | PCB fault | OFF | OFF | Try turning the appliance off then on again and verify the operation of the control boards, if necessary replace it. |
| F2 | Excessive number of ON/OFF (RELEASE) | OFF | OFF | Temporarily disconnect the product mains. |
| 3 | Lack of communication between the PCB and interface | OFF | OFF | Try turning the appliance off then on again and verify the operation of the control boards and replace them, if necessary. |
| For further technical help contact technical advice.<br>*See back page for contact details | | | | |

## 8.4 FAULT FINDING

**See back page for Ariston contact details.**

| Problem | Posible Reason | What to do |
|---|---|---|
| Water comes out cold or insufficiently warm | Low temperature set. | Increase the set temperature to 55°C |
| | Device functioning errors. | Check for errors on the display and refer to 'what to do' in 8.3 Error Codes. |
| | No electrical connection, disconnected or damaged wiring. | Check the voltage at the supply terminals, verify the integrity and connections of the cables. |
| | Functioning in 'Voyage' mode. | Check 'Voyage' mode P6 is set to OFF. |
| | Product off | Check availability of electricity, turn on the product. |
| | Running off a lot of hot water whilst the NUOS is heating up. | Wait until NUOS has heated water before running taps. |
| | Probe error. | Replace probe |
| The water is overheating (with the possible presence of steam from the taps) | High level of scaling of the boiler and components | Descale |
| | Probe error. | Replace probe |
| | Evaporator clogged or frozen. | Check the evaporator, canals and grids are clean. |
| | Temperature set too high | Lower max set temperature P3 |
| Water/steam being discharged to tundish. | System overheating | System overheating. Turn power to the NUOS off, run hot tap; take care, water will be hot. Possible cause - control system and/or sensor error. |
| Reduced functioning of the heat pump | Air temperature out of range. | |
| | 'Time W' value too low | Set a parameter for lower temperature or a longer unit of 'Time W'. |
| | Electric voltage too low. | Provide a proper electric voltage. |
| | Evaporator clogged or frozen. | Check the evaporator, canals and grids are clean. |
| | Problems with the heat pump circuit. | Make sure that there are no errors on the display. |
| | No electrical power. | |
| | NUOS requires 8 days to normalise and achieve optimum performance. | |
| | P7 parameter set to OFF and outside air temperature blow 10°C. | Set parameter P7 ON. |
| | Fan not working | Check fan and connections. |
| Insufficient flow of hot water | Leaks in the water circuit. | Verify that there are no leaks along the circuit. |
| | Obstructions in the water circuit. | Check hot and cold feed isolating valves are open. |
| | | Check line stainer |
| Magnesium anode degradation. | It is normal for the magnesium anode to deplete. The rate of depletion is dependent on the supplied water quality. Under some circumstances parts of the anode will break off and may come out of the hot tap. This is not a fault with the product. | |

# EXTERNAL AIR SOURCE HEAT PUMP WATER HEATER

This Commissioning Checklist is to be completed in full by the competent person who commissioned the heat pump and associated equipment as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission this equipment to the manufacturer's instructions may invalidate the warranty but does not affect statutory rights.

Customer Name

Address

Telephone Number

Heat Pump Make and Model

Heat Pump Serial Number

Commissioned by *(print name)*

Certified Operative Reg. No. [1]

Company Name & Address

Commissioning Date

Telephone No.

Building Regulations Notification Number *(if applicable)* [2]

## ALL SYSTEMS

| | |
|---|---|
| What is the incoming static cold water pressure at the inlet to the system? | bar |
| Has a strainer been cleaned of installation debris (if fitted)? | Yes ☐ No ☐ |
| Is the installation in a hard water area (above 200ppm)? | Yes ☐ No ☐ |
| If yes, has a water scale reducer been fitted? | Yes ☐ No ☐ |
| What type of scale reducer has been fitted? | |
| What is the hot water thermostat set temperature? | °C |
| What is the maximum hot water flow rate at set thermostat temperature (measured at high flow outlet)? | *l/min* |
| Time and temperature controls have been fitted in compliance with Part L of the Building Regulations? | Yes ☐ |
| Type of control system (if applicable) | Y Plan S Plan ☐ Other ☐ |
| Is the cylinder solar (or other renewable) compatible? | Yes ☐ No ☐ |
| What is the hot water temperature at the nearest outlet? | °C |
| All appropriate pipes have been insultated up to 1 metre or the point where they become concealed | Yes ☐ |

## UNVENTED SYSTEMS ONLY

| | |
|---|---|
| Where is the pressure reducing valve situated (if fitted)? | |
| What is the pressure reducing valve setting? | bar |
| Has a combined temperature and pressure relief valve and expansion valve been fitted and discharge tested? | Yes ☐ No ☐ |
| The tundish and discharge pipework have been connected and terminated to Part G of the Building Regulations | Yes ☐ |
| Are all energy sources fitted with a cut out device? | Yes ☐ No ☐ |
| Has the expansion vessel or internal air space been checked? | Yes ☐ No ☐ |

## CENTRAL HEATING MODE

Heating Flow Temperature ☐ °C  Heating Return Temperature ☐ °C

## DOMESTIC HOT WATER MODE *Measure and Record*

Is the heat pump connected to a hot water cylinder? ☐ Unvented ☐ Vented ☐ Thermal Store ☐ Not Connected

Hot water has been checked at all outlets ☐ Yes  Have Thermostatic Blending Valves been fitted? ☐ Yes ☐ Not required

## ADDITIONAL SYSTEM INFORMATON

Additional heat sources connected: ☐ Gas Boiler ☐ Oil Boiler ☐ Electric Heater ☐ Solar Thermal  Other _____

## ALL INSTALLATIONS

| | |
|---|---|
| Hot water and ventilation systems comply with the appropriate Building Regulations | Yes ☐ |
| All electrical work complies with the appropriate Regulations | Yes ☐ |
| The heat pump and associated products have been installed and commissioned in accordance with the manufacturer's instructions | Yes ☐ |
| The operation of the heat pump has been demonstrated to the customer | Yes ☐ |
| The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer | Yes ☐ |

Commissioning Engineer's Signature

Customer's Signature

*(To confirm demonstration of equipment and receipt of appliance instructions)*

**Notes:** [1] Installers should be members of an appropriate Competent Persons Scheme. [2] All installations in England and Wales must be notified to Local Area Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer. [3] May be required for systems covered by G3 Regulations

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benchmark COLLECTIVE MARK
THE MARK OF QUALITY FOR THE INSTALLATION, COMMISSIONING AND SERVICING OF DOMESTIC HEATING AND HOT WATER SYSTEMS

TERMS AND CONDITIONS OF GUARANTEE

The Ariston External Air Source Heat Pump Water Heater is guaranteed for 5 Years (Tank) and 2 Years (electrical components).

Please read these terms and conditions which are in addition to any terms and conditions detailed in this book or any registration card supplied with your appliance.

**Ariston External Air Source Heat Pump Water Heater systems must only be installed and commissioned by accredited and approved installers. Failure to comply with this requirement will invalidate the warranty.**

**A charge will be made to the owner of the appliance if:-**

1. The reason for any service visit is as a direct result of a failure to install the appliance in accordance with the manufacturer's instructions.
2. Your installer does not complete the necessary commissioning process and procedure as detailed in the Installation and Operating Instruction manuals.
3. Your appliance is not serviced on or before the 12 month anniversary of installation.
4. Our service engineer calls as requested and the failure is a non-manufacturing defect.

Failure to pay an invoice for any such occurrence **will** be assumed by Ariston Thermo Group that you accept that your appliance has not been installed correctly and understand that any manufacturer's guarantee has been withdrawn.

On the 12 month anniversary of the appliance installation, you must have it serviced to continue any guarantee offered into the following year. Failure to do so **will** invalidate your guarantee and should an Ariston Thermo Group engineer be required to attend and no proof of service documentation is made available, then Ariston Thermo Group **will** charge.

If you have a problem with commissioning on installation, please contact our Technical Department on 0333 240 7777

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**0333 240 7777 Technical**

**0333 240 6777 Spares**



External Air Source Heat Pump Water Heater
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